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OVERSEAS RAILWAYS

SPECIAL NUMBER OF THE RAILWAY GAZETTE

On Tuesday next there will be issued a Special Number of "The Railway Gazette" devoted entirely to recent progress made by, and current problems affecting, various railways in the Colonies, Dominions, India and other countries such as Argentina and Brazil where British-owned railways operate or are partly British-officered. This number is additional to the ordinary weekly issue, and will be sent to all annual subscribers. Extra copies, price 2s., may be obtained through any newsagent, or direct from the Publisher, post free, 2s. 6d.

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue.

About It and About

THE debate in Parliament on November 17, reported on another page, was not notable for constructive thought, mainly because no clear objective was specified. Mr. F. B. Simpson moved a resolution that co-ordination of transport was essential, and that complete co-ordination could be secured only through unified public ownership. But he did not say *why* he regarded co-ordination as essential, and no other member asked him, nor was any member deterred from saying his say by the omission to define the policy he was supposed to discuss. Co-ordination, however, is not in itself a policy, but a means of implementing one; and it is not merely useless to debate about a means without specifying what the desired end may be; it is dangerous. It wastes time and induces muddled thinking; and, worst of all, it may easily lead to the adoption of some method that would eventually achieve a policy desired by none, and to which no one would have agreed had it been revealed originally. A principle to be violated at peril is respect for the proper priority of doing things. If any enterprise is to be successful, the policy must first of all be clearly defined. That done, it is rather for experts than the people's representatives in Parliament to devise the means.

* * * *

The Week's Traffics

Coal contributes £95,000, merchandise £62,000, and passenger train traffic £30,000 to the combined increase of £187,000 in receipts shown by the four main line railways for the past week. This compares with an increase of £148,000 for the previous week and with one of £97,000 for the week before that. Combined earnings for the year to date amount to £145,336,000, an increase of £6,204,000 or 4·46 per cent. Passenger train receipts are £64,917,000, an increase of £2,630,000; in the merchandise earnings of £50,725,500 there is an advance of £1,629,500; and the coal class traffics of £29,693,500 show a gain of £1,944,500.

	46th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R.	+ 13,000	+ 22,000	+ 39,000	+ 74,000	+ 2,349,000	+ 4·17
L.N.E.R.	+ 9,000	+ 30,000	+ 42,000	+ 81,000	+ 2,011,000	+ 4·92
G.W.R.	+ 1,000	+ 8,000	+ 13,000	+ 22,000	+ 1,192,000	+ 5 11
S.R.	+ 7,000	+ 2,000	+ 1,000	+ 10,000	+ 652,000	+ 3·50

London Transport receipts for the past week amounted to £550,000, a decrease of £12,100, against an increase of £25,700 for the corresponding week in 1936. Aggregate receipts for the 21 weeks to date show an increase of £31,000. Mersey traffics for the 46 weeks of the year amount to £193,103, an increase of £5,262. The Great Northern Railway (Ireland) has a decrease of £350 for the week, and the Great Southern an increase of £1,997.

* * * *

Progress of New London Railways

Despite delays resulting from the difficulty of obtaining steel and other materials within recent months, considerable progress has been made with the London Passenger Transport Board's programme of new railway works which was begun in 1935. A week or two ago the annual report of London Transport for the year ended June 30 last recorded that some three-quarters of the new tube tunnels between Baker Street and Finchley Road had been constructed, and now the boring of this 2¼ miles of double tube tunnel has just been completed with very little ostentation. We understand that this particular section of the work has been finished exactly in schedule time and it is hoped to run the first Bakerloo train to Wembley Park and Stanmore about the middle of 1939. Further

reference to this work is made on page 940. Work at Aldgate East station is also progressing satisfactorily and with the minimum of inconvenience to surface traffic. On page 929 we illustrate the exceptional methods adopted to insert the roof girders, working from below instead of from above. In the northern suburbs of London the extension of the tube from Highgate to East Finchley is more than half finished and it is expected that tube trains will be projected over the newly electrified lines of the L.N.E.R. to Barnet and Edgware via this new link in the early part of 1939.

* * * *

The Late Sir Seymour Tritton

Some measure of the loss sustained by the engineering profession in the sudden death last Sunday of Sir Seymour Biscoe Tritton, active Senior Partner until his retirement early this year in the firm of Messrs. Rendel, Palmer and Tritton, Consulting Engineers, may be gauged from the obituary notice we publish on page 930. While his principal concern was with railway engineering, Sir Seymour had also been trained in the marine branch of his profession, deriving therefrom a versatility which stood him in good stead when on his arrival in India he was faced with the erection of a river flotilla, with no appliances or docks and little skilled labour to assist him. As a consulting engineer, he impressed his ideals upon his designing and inspecting staff, whose competence is acknowledged to be largely responsible for the high standard of railway equipment attained in India during Sir Seymour's 40 years' connection with the engineering problems of that country. He insisted, moreover, upon courtesy in the spirit as well as in the letter of contract of his inspecting staff. To the matter of standardisation, also, Sir Seymour Tritton brought an individualism of approach which derived the greatest benefits from the principle for all concerned, applying it as an accessory to progress instead of an occasional restraint.

* * * *

United Railways of the Havana

For the first time since 1931-32 the operation of the combined undertakings of the United Railways of the Havana & Regla Warehouses showed a small profit in the year ended June 30 last. Although there was a loss of £19,350 on working the railway, a profit of £32,093 was earned by the warehouses and wharves. Railway gross receipts improved by £166,351 or 13·41 per cent., and expenditure increased by £127,408 or 9·81 per cent. in comparison with 1935-36. The increase in gross receipts was mostly due to the larger sugar crop, but other traffic generally showed a slight upward tendency, the only decrease worthy of mention being in passengers on the Havana suburban electric lines, which the company is still obliged to maintain. Road competition has been more intense than before.

	1936–37	1935–36
Passengers	3,079,772	4,175,698
Public goods, tons	7,506,705	6,229,214
Revenue train-miles	4,223,652	4,402,974
Average miles open	1,353	1,356
Operating ratio per cent. ..	101·38	104·70
	£	£
Passenger receipts	162,743	171,321
Goods receipts	1,028,732	887,990
Gross receipts	1,407,041	1,240,690
Expenditure	1,426,391	1,298,983
Loss on working	19,350	58,293

Maintenance expenses showed an increase of £92,363 or 22·20 per cent., out of which increase £50,000 was set up as a reserve for renewals. Transport expenses increased by £15,732 or 2·68 per cent.

The Cordoba Central Railway

In our Overseas columns this week we outline the sequence of events that led up to the promulgation of a remarkable Decree by the Argentine Government with regard to the immediate future of the Cordoba Central Railway. The decision taken by the Government is probably the best solution to an extremely difficult situation. The men, evidently realising that the Government was, for some reason or other, disinclined to take coercive measures, were clearly determined not to return to work until the wage cuts had been suppressed, a line of action which the financial position made impossible for the company. A deadlock had therefore been reached, and as, apart from the loss and inconvenience caused by the disorganisation of the service, the movement had already extended to the Entre Rios and Argentine North Eastern Railways, the employees of which were also demanding the cancellation of the wage deductions on those lines, the Government decided to solve a knotty problem by placing the Cordoba Central line provisionally under the control of the State Railways, thus enabling the employees of the company to be paid at the same rates as those of the State lines, while at the same time guaranteeing the company profits equal to those earned during the last financial year. The leasing of the line to the State Railways may be regarded as the preliminary step towards its eventual incorporation in the national railway system, as it is expected that Congress will, in due course, ratify its purchase by the State.

* * * *

Developments in L.N.E.R. Passenger Comfort

The extensive L.N.E.R. carriage construction programme for 1938, recorded on our Contracts and Tenders page in this issue, announces some interesting developments in L.N.E.R. passenger comfort. The Flying Scotsman services are to be worked by two fifteen-vehicle sets of an entirely new design. Continental passengers between Liverpool Street and Harwich are to ride in stock of which the upholstery and furnishing will set a new standard in Continental boat trains. To cater for the growing demand for accommodation on the Silver Jubilee four-hour express between Newcastle and King's Cross, an extra third class streamlined coach is to be added. The ability thus acknowledged of the steam locomotives to keep time with the heavier train is a tribute both to their design and to the flexibility in the operation of high-speed services which they allow. Cross-country and surburban travellers are also to have new trains; excursion travel will be catered for by a new tourist car set for service in Scotland, and by a substantial increase in the number of open cars suitable for party travel. Altogether 730 coaches are to be constructed under this enterprising programme.

* * * *

Reichsbahn Film Service

During the past few days, two audiences of British railwaymen have had the opportunity of seeing examples of the very fine work carried out by the Reichsbahn Film Service, a selection of recently-produced films having been brought to this country by Herr Müller-Hillebrand. Of course, the use of the film for both propaganda and instructional purposes is no novelty in railway service, and, in fact, is widely employed by the four British main-line railways, as we have reported in our columns from time to time. The characteristic thoroughness of the German productions, however, resulted in fields being covered which, so far as we are aware, are new to this type of work. For example, the first film displayed was one dealing with the progress of the Reichsbahn during

1936 and was prepared for popular exhibition. Last year, of course, the handling of the very heavy traffic in connection with the Olympic Games taxed the resources of the Reichsbahn to the full, and the shots of this enormous international traffic being dealt with smoothly were an impressive indication of the efficiency of the system. Another film shown was an instructional subject dealing with the correct use of braking devices to avoid rough handling of wagons during shunting operations, and a third film—like the first designed for public exhibition—depicted the processes of the assembly of the first " 05 " class streamlined express steam locomotive. The programme was happily concluded with a coloured " fairy story " cartoon in which speed rivalry between all the animals was shown by " Father Oak Tree " to pale before the apotheosis of speed as exemplified by modern Reichsbahn practice.

* * * *

Amalgamation of Signal Boxes

Mr. A. Moss, Signal and Telegraph Engineer (Scotland) L.N.E.R., opening a discussion on October 6 at the Institution of Railway Signal Engineers on " Central Box Amalgamation Schemes," drew attention to a number of important points bearing on the tendency, growing for some years now, to concentrate control of signalling movements over large areas in one central signal box, providing at the same time continuous track circuiting for some distance and very often colour-light signals, which not only facilitate traffic working but make it safer by diminishing the risks of the human element. It is known that large economies have sometimes been realised in this way, by eliminating methods which were good enough when manual working of points and signals was all that was known. Economy is important, but the provision of better and safer—above all faster and more punctual—services should now be the leading idea impelling us to enlarge the scope of modern signalling methods, and in that direction there remains plenty to be done, as we gather Mr. Moss feels, too. Greater concentration of control has raised the question of possible serious dislocation of traffic in the case of cables or the signal box being damaged. tI has even given rise t othe idea of providing separate means of operating outlying groups of functions locally by a sort of emergency signal box, itself fully interlocked, should control from the centrol point be interrupted. This is an interesting feature of the so-called " semi-independent " interlockings of the Eastern Railway of France described in our issue of June 11, 1937. The same railway now always provides point operating commutators at various locations in an installation for use should a signal box be seriously damaged.

* * * *

Reducing Rail Side Wear

A permanent-way problem that became acute with the extension of railway electrification, particularly where nose-suspended motors are mounted on the bogies of multiple-unit trains, is that of the side wear of the rails and the wear of the wheel flanges. So heavy can this be that rails have sometimes had to be changed on sharp curves as often as every few weeks. The problem has been greatly eased by the introduction of means to lubricate either the wheel flanges or the rails themselves, but the efficient lubrication of the rails has called for very careful experimentation to ensure that there should be no risk of the lubricant getting on to the head of the rails and so causing the wheels to slip. During the past few years several types of effective rail lubricators have been evolved with remarkable results in the reduction of side wear and flange wear. Rails that previously required frequent changing under heavy electric traction now stand up successfully for three or four times as long when protected by lubricators. Nevertheless the perfecting of the lubricator itself has been the subject of prolonged test. One of the most effective instruments we have so far seen is illustrated and described on page 928 of this issue, and although it has not yet been long on the market the soundness of its design points towards its widespread successful operation.

* * * *

From Compound to Simple

In 1929, a very remarkable locomotive was built at the Darlington works of the L.N.E.R. It was a four-cylinder compound constructed on what has generally been accepted as the 4-6-4 wheel arrangement, although actually it had two separate pairs of carrying wheels at the trailing end, which did not form a bogie. The boiler, which in principle and design constituted the main departure from customary practice, was of the water-tube type, in planning which the firm of Yarrow & Co. Ltd. co-operated with the railway company's Chief Mechanical Engineer, Mr. (now Sir) H. Nigel Gresley. In this way, a wide and intimate experience of water-tube boiler construction was combined with an equally intimate knowledge of locomotive design, and of the conditions under which steam locomotives operate. It was a bold experiment, and was in a measure successful. In spite, however, of a combination of high steam pressure and the principle of compounding, the engine did not prove economical in coal consumption, and that being a matter of such great importance, Sir H. Nigel Gresley decided to convert it from a four-cylinder compound to a three-cylinder simple, in which condition the locomotive is now doing excellent work. It ranks as the most powerful six-coupled express engine in Britain, its tractive force at 85 per cent. of the boiler pressure—which, by the way, has been reduced from the original 450 lb. to 250 lb. per sq. in.—being 41,437 lb. With its three 20-in. by 26-in. cylinders, six coupled wheels, and large boiler, the locomotive will be able to maintain high average speeds with very heavy train loads on the main lines of the L.N.E.R.

* * * *

The Right Perspective

The very large coloured advertisement posters neatly arranged by London Transport on the far-side walls of Underground railway stations, are no doubt pleasing and stimulating to the passenger as he parades the platform, but has consideration been given to the appearance they present when viewed in sections through the windows of a stationary train? An enormous set of gleaming dentures may gnash ferociously at us, making us shift uneasily in our seat. When the train has vanished, however, the apparition turns out to be a seductive siren energetically demonstrating to those on the platform the fact that she has MacOdolled her teeth today. A gory claw pointed meaningly at us, is but the roseate limb of a toothsome tinned crab—not the one recently discovered at Highgate—but a proud specimen of the variety of which it is announced " Whatever's on the label's in the tin." What may look like a broadside view of a large éclair, is in fact the luscious lips of Miss Marlene Garbo, inviting us to wallow in glamour in her forthcoming film. When, however, a glass of Guinness stands in frothy magnificence, framed and separated from the Walrus and Carpenter (its companions of the moment), then " My goodness " is indeed the only cry that can escape from the passenger's suddenly constricted throat.

Austrian Steam Railway Centenary

PARTLY by reason of its outstanding place in the European politics of the early eighteenth century, and also because of geographical difficulties, Austria has played no mean part in the development of Continental railways. As early as 1808 Dr. Franz Joseph Ritter von Gerstner recommended a railway line to link the rivers Danube and Moldau (now Vltava) along the old salt route, and eventually his son, Franz Anton Ritter von Gerstner, secured a concession dated September 7, 1824, for a *Holz- und Eisenbahn* (wood and iron road) which materialised as the famous Linz-Budweis line. Gerstner junior wished to use locomotive traction, but failed to secure the support of his associate, so horses and bullocks had to suffice for both passenger and goods service. The pioneer of steam traction in Austria was Franz Xaver Riepl, who first proposed to develop some horse-worked mining railways, but, after the success of George Stephenson's *Rocket*, advocated a steam railway from Bochnia to Vienna (280 miles) and an even more ambitious extension to Trieste (931 miles). He enlisted the support of the great banking house of Rothschild, which eventually decided to confine the scheme to the Vienna-Bochnia section, at any rate for the time being.

On April 15, 1835, at the suggestion of Prince Metternich, who was in a position to assure the banker in advance that his request would be granted, Solomon Rothschild decided to put forward his official application for a concession to build a steam railway from Vienna to Bochnia. The Emperor Francis I, who had been known to be opposed to any such venture, had been dead only six weeks, and the new Emperor Ferdinand I (whom Rothschild's "most loyal and humble bank" addressed in its cleverly-worded application as "Most Excellent and Most Puissant Emperor! Most Gracious Emperor and Lord!") was informed that for several years the bank had been conducting the most careful investigations into the scheme. The formal authority was granted on March 4, 1836, and thus the Kaiser-Ferdinands-Nordbahn was founded. On April 1 the *Allgemeine Zeitung* said that "the iron railroad to Galacia" was to be begun that month, and it was hoped to complete it as far as Brünn in eighteen months. The journey from Vienna to Brünn with post horses, which then took 15 hr., would require only 4 hr., and the dearness of provisions, which had for some time past been much felt at Vienna, would be remedied in proportion as the railroad was laid down, because the supplies from Galacia would come more rapidly, and at less expense than heretofore. It was added that potatoes, for example, cost in Galacia only one third of what they did at Vienna.

In order to comply with the stipulation contained in the concession that at least one (Austrian) mile of line (7·58 km.) was to be ready within two years, the 13-km. section from Floridsdorf to Deutsch-Wagram was laid rapidly and trial trips with steam traction were carried out on November 12 and 14, 1837. The first public runs began on November 23, and this event has been celebrated during the past few years. On Monday wreaths were laid on the grave of Franz Xaver Riepl, and on Tuesday a memorial was unveiled at Floridsdorf. The Stephenson-built locomotive *Austria* hauled a train of eight vehicles with a total weight of 38 tonnes at 33 km. p.h. on that memorable occasion one hundred years ago, and, as it is from that date that the Austrian authorities reckon the beginning of their steam traction history, we publish on pages 921 to 924 of this issue an article entitled "A Century of Steam Traction in Austria" by Herr Emerich Karner, Chief Mechanical Engineer, Austrian Federal Railways. The repeated experimental runs attracted considerable attention to steam traction, and on the completion of the wooden bridge over the Danube it was possible to inaugurate regular public traffic on January 6, 1838, between Vienna and Deutsch-Wagram; at first there were only two trains each way on week days and three on Sundays. In announcing this opening, *The Railway Times* of January 27, 1838, quaintly referred to the railway under the literal translation of its title "Emperor Ferdinand's Northway."

No account of locomotive development in Austria would be complete without reference to the notable influence exercised by the two Gölsdorfs. The senior, Ludwig Adolf Gölsdorf, was born at Plaue, near Augustusburg (Erz Mountains), and attended technical institutes at Chemnitz and Dresden. He was for some years in the service of the Saxon State Railways, and in 1860 accepted an invitation to become locomotive engineer of the Austro-Hungarian State Railway Company, at the head of which was the Scotsman, John Haswell, who went to Vienna in 1838 and founded locomotive building in Austria. In 1861, however, Adolf Gölsdorf left Haswell's service and joined the Südbahn, with which company he soon reached the front rank of locomotive designers. He directed particular attention to the improvement of mountain locomotives, which he introduced with great success on the Giovi line, where the conditions were worse than on the Semmering railway. He introduced new ideas also in the construction of goods and tank engines. Gölsdorf was largely responsible for remodelling the Südbahn rolling stock and its equipment with improvements called for by modern requirements, such as steam heating, continuous brakes, speed recorders, and smoke dispersion apparatus. Many valuable technical papers are due to him and show his wide attainments. Gölsdorf retired in 1900 and died three years later. Karl Gölsdorf was born on June 8, 1861, and for some years was employed by the Austro-Hungarian State Railway Company. In 1891 he became Chief Mechanical Engineer of the Austrian State Railways and entered upon that eventful stage of his career which was to make him become recognised as one of the greatest locomotive engineers in the world. Some of the main ways in which he influenced design are referred to briefly in Herr Karner's article, and it is enough here to record that, at the time of his death on March 18, 1916, Karl Gölsdorf had designed about sixty different types of locomotives for express, ordinary passenger, and goods traffic.

* * * *

Railway Freight Rebates

OWING to the indisposition of one of its members, the Railway Rates Tribunal was unable to carry out its review of the Railway Freight Rebates Scheme on November 17, and adjourned the Court until November 25, as indicated in THE RAILWAY GAZETTE of November 19, at page 898. The President took the opportunity, however, of having an informal discussion relative to the request of the railway companies that the sum of £978,882 should be retained in the fund pending the final ascertainment of the monies payable to the companies by way of adjustment under Paragraph 2, Part 1 of the Eleventh Schedule to the Local Government Act, 1929, in respect of the period April 1, 1931 to December 31, 1936. At the invitation of the President, the companies intimated that, following consultation with the trading interests concerned, it had been agreed to propose that the existing rebates should be continued during the twelve months ending September, 1938. He expressed the view

informally, however, that the balance to be brought into the fund for the currrent year was £978,882, less the debit balance of £7,096 in respect of the period ended September 30, 1937, making a net surplus of £971,786. In the absence of a certificate from the Minister of Transport under paragraph 11 of Part 1 of the Eleventh Schedule to the 1929 Act, as amended by the Railway Freight Rebates Act, 1936, he considered that the tribunal had no alternative but to take this sum into account in determining the level of the rebates for the ensuing twelve months.

At the same time, the President made it clear that he appreciated that the surplus of £978,882 in respect of the period to December 31, 1936, was intended to liquidate in part the sums overpaid by the companies into the fund. He suggested, therefore, that the difficulty could be overcome if the Minister of Transport granted a certificate enabling the tribunal to calculate the rebates so that they would not absorb the whole of the net revenue of the fund, or if the Minister authorised a further substantial payment to the companies under Section 2 of the Railway Freight Rebates Act, 1936, in respect of past overpayments. Subsequently, the railway companies discussed the position with the Ministry of Transport and, as the progress made in the settlement of the valuations in England and Wales for the quinquennial periods concerned reveals no reason for modifying the previous estimate of overpayments, viz., £9,762,644, the Minister has authorised the Railway Clearing House to make a further payment on account to the companies of £850,000. This will thus reduce the credit balance as at December 31, 1936, from £978,882 to £128,882. The payment of £850,000 will not, of course, affect the net revenues of the four group companies, as credit was taken in their 1936 accounts for the closest possible estimates which could be made of the total corrections of their rate and freight rebates fund payments to December 31, 1936. The sum of £8,785,000 has already been paid to the companies and the further payment of £850,000 will represent a total of £9,635,000 against the estimated overpayments to the fund of £9,762,644, leaving a balance of £127,644 outstanding.

* * * *

Transport and the Growth of Cities

PROPHETS are confident people possibly owing to the length of time that must sometimes elapse before their forecasts can be expected to materialise. Here, for example is the prophecy quoted in the *Bath Chronicle* of a century ago concerning the benefits that the newly-introduced railways would confer on London: "There is, I think, one positive good which will result from railways—they will prevent the fearful collection of myriads in one place. I am quite satisfied that whatever size London may now be, which is a piece of knowledge, you are aware, that I shall never arrive at, it will swell no more. The wen has suffered its last expansion, and it will no more threaten to exhaust and dry up the body of the country. It will presently be the fashion for men to have little cabinets for business purposes in those localities of trade, law, ships, or arts, to which they are attached; and they will contract with companies to steam them to their country houses each evening, where they can look on green things, smell sweet ones and go to bed in quietness and peace. Within 15 miles of London, groups of habitations will arise, which will merit names as distinctive as those borne by a hundred villages now having quiet standing within the same distance." Men certainly contract today with railways to transport them to and from their business, but to such an extent that we are plagued with the very "fearful collections of myriads in one place" which the prophet condemned. We are still only in an intermediate stage, however, and the eventual realisation by mankind that work is not an end but a means may at some distant date lead to the fulfilment of the pleasant prophecy.

* * * *

Central Uruguay Railway

A SCHEME of arrangement became operative on June 30, 1937, under which the capital of the Central Uruguay Railway Company of Monte Video was completely reconstructed and a fusion of its interests was effected with those of the three Extension Railways which it worked and of the North-Eastern of Uruguay Railway of which it had a lease. Details of the scheme were given in THE RAILWAY GAZETTE of May 7, 1937, on page 915. It was accordingly not in force during the financial year ended June 30 last on which the report has now been published. There has therefore to be charged against the revenue for the year to that date the interest on the old debenture issues and the net amount due to the extension companies under the terms of the working agreements, showing that the operations of the Central Company by itself resulted in a loss of £182,022. Had the scheme been in operation for the year under review, the net income, before charging interest on the new debenture issues, would have amounted to £108,085. Some operating figures for the combined undertaking are shown in the accompanying table:—

	1936–37	1935–36
Passengers	4,638,731	4,416,580
Public goods, tons	934,422	946,393
Average receipt per ton ..	9s. 2·47d.	8s. 6·96d.
Train-miles	2,513,613	2,633,777
Operating ratio, per cent. ..	84·73	80·42
	£	£
Passenger receipts	185,813	147,292
Goods receipts	430,139	406,022
Gross receipts	942,107	823,366
Expenditure	798,264	662,161
Net receipts	143,843	161,205

Results from passenger traffic are significant of the effects of cheaper fares and higher speed traffic by railcar, especially on longer distance travel. Although the number of train miles run by steam trains has been reduced as shown above, railcar miles have increased from 164,268 to 757,894. The decrease in goods tonnage was accounted for mainly by smaller Brazilian interchange traffic and the absence of construction material for the Rio Branco—Treinta y Tres line due to the completion of that railway at the end of the previous period. The decrease in transit traffic to and from Brazil was almost entirely due to the appreciation of the peso in terms of milreis which has created a bias in favour of alternative routes and other markets. In the case of higher-rated traffic such as wool, the company has been able to adjust rates to the new conditions and avoid loss of the traffic, but timber which accounts for the greater part of the decrease is too low-rated to allow the necessary margin.

Locomotive costs and in particular the cost of fuel have been affected by increases in the sterling price and local charges payable on oil. The mechanisation of the permanent way gangs has been completed and is yielding not only the anticipated economy in man power but also greater efficiency. The free exchange rate of the Uruguayan peso rose during the year under review from 24·19d. to 27·88d. Immediate traffic prospects are encouraging since the wool clip is expected to be heavier and the demand greater. The tonnage of cereals is likely to be heavier because of an increase of 25 per cent. in the area sown under favourable conditions.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Design of Coaching Stock

Cleveland, Sheen Common Drive,
Richmond, Surrey
November 13

To the Editor of The Railway Gazette

Sir,—Further to the correspondence on railway carriage design, I would say that not only are the doors of the new Great Western Railway corridor coaches too narrow, but the vestibuled ends also. It is absurd to build coaches with such narrow and restricted passages just at the point where passengers are entering or leaving the coach. If the coach ends were bowed as on the London & North Eastern corridor coaches more space could easily be obtained without adding to the length of the coach, and it would have the additional advantage of bringing the coach ends nearer together and shortening the gangway connections.

If the doors were inset 6 in. into the coach side they could be widened and still kept inside the clearance outline.

I do not agree with your comment that it is impossible in this country to obtain deeply opening windows because coach sides must be curved. There is no reason why coaches should not be built flat-sided—in fact, all Pullman coaches *are* flat-sided.

I should like to add that it is high time that British railways ceased to build wooden-framed rolling-stock camouflaged by steel sheets to look like all-steel stock.

At the Paris Exhibition is a very fine railway exhibit to which all the principal countries of Europe (except Britain) sent their latest passenger coaches and sleeping cars, and I was impressed by the fact that every single coach was of *all* steel construction.

I am, Sir,
Yours faithfully,
D. C. MACCURRACH,
M.I.MECH.E., M.I.STRUCT.E.

[Our correspondent overlooks the fact that the straight-sided Pullman cars are not built to the full 9-ft. width of curved-sided ordinary stock, their normal maximum width being limited to 8 ft. 7 in. on account of loading gauge restrictions.—Ed. *R.G.*]

Railway Electrification and Road Widening

The British Railway Stockholders Union,
25, Victoria Street, London, S.W.1
November 20

To the Editor of The Railway Gazette

Sir,—During the last few months there has been a revival of the type of speech which finds a cure for unemployment in the electrification of the railways, and a solution to the problem of road casualties in a vast increase in the mileage of our roads. No doubt many of these speeches are honestly intended, but that does not affect the fact that they are misleading. A speech recently delivered by Lord Weir in Glasgow will serve to illustrate what I mean. "One of the best preventives for cold feet in regard to future industrial activity," he remarked, "should be the knowledge that sooner or later the railways of this country must and would be electrified under the ægis of the Ministry of Transport." Dealing with the road problem, Lord Weir said that the question was whether the nation's road capacity was being reviewed and planned to meet the dual problem of increasing needs and greater safety.

No one will dispute that as a preventive for cold feet amongst the holders of shares in electrical concerns the prospect held out by Lord Weir, if it has any foundation in fact, would be most effective. Unfortunately, as every railwayman who has studied the problem is well aware, electricity has nothing to offer our British railways apart from the advantages which it admittedly possesses when dealing with intensive suburban traffic. The thousands of miles of railway running through sparsely populated country districts will never be electrified while the railways remain under the control of responsible officers whose actions are submitted to the annual test of a balance sheet. If they are to be electrified under the ægis of the Ministry of Transport it will be the taxpayer who will provide the profits of the manufacturers of the electrical plant.

All that need be said of the reference to road casualties is that about 17 accidents in every 20 bear no relationship whatever to the condition of the road at the point at which the accident occurs. Such accidents are due to a failure on the part of a driver correctly to assess the requirements of a particular situation, and such a failure may, and in fact does, occur as frequently on a broad and straight thoroughfare as in a narrow and crooked lane. May I suggest that the burning question at this moment is not whether the railways shall be electrified or the roads widened, but whether the credulity of the taxpayer shall continue to be grossly exploited by the champions of industries concerned with the manufacture of electrical plant or road making material.

I am, Sir,
Your obedient servant,
ASHLEY BROWN,
General Secretary

What Streamlining Weighs

Broad Street House,
54, Old Broad Street, E.C.2
November 22

To the Editor of The Railway Gazette

Sir,—Your editorial under the above heading is certainly a revelation, more particularly to suppliers of materials used in the construction of locomotive engines where the weights have been strictly limited, and considerable trouble and expense have been incurred in meeting the requirements of the railway company; involving, in some cases, a saving of only a few cwt. and in others the replacement of well-known efficient and lasting materials by those of light weight which require periodical renewal.

The advantages of streamlining above certain speeds have apparently been proved by tests carried out by the best-known scientific institutions in such a manner that they are above suspicion. There are many engineers who are still very sceptical, and it may be that the instructions or "terms of reference" for these investigations were such as to overlook one or more factors which obtain in actual practice under traffic conditions. It is of course well known that in obtaining counsel's opinions on patent and other problems that these opinions are influenced to a large extent by the manner in which such problems have been submitted for their consideration; they are, therefore, not to blame if their opinions are wrong any more than the results of tests above referred to.

In many cases the results of such tests are very disappointing to those on whose behalf they are made, owing to the fact that there may be a lack of information of other tests to which they can be compared. It is perhaps only human nature to accept results or opinions without further question when they agree with our own pre-conceived conclusions, but it does not prove that they are right.

Yours faithfully,
S. H. H. BARRATT
ASSOC. M.INST.C.E., M.I.LOCO.E.

PUBLICATIONS RECEIVED

The British Isles : A Geographic and Economic Survey. Second edition. By L. Dudley Stamp and Stanley H. Beaver. London : Longmans, Green & Co. Ltd., 39, Paternoster Row, E.C.4. 9 in. × 5¾ in. × 1½ in. 719 pp. Illustrated. Price 25s. net.—The four years which have elapsed since the first edition of this excellent work appeared have brought financial and economic changes of such importance as to necessitate very considerable revision in the chapters dealing with manufacturing industries—particularly the heavy industries. Whilst there are numerous minor revisions of fact and expression throughout the book, the most extensive textual alteration has been made in the chapters on iron and steel. Other smaller sections which have been largely or partly re-written are the chapter on soils, and the sections on hydro-electric power, artificial silk, and Irish commerce. On the statistical side some twenty graphs and about a hundred tables have been revised.

Obstruction Danger : Stories of Memorable Railway Disasters. By John Thomas. London : William Blackwood & Sons Ltd., 37, Paternoster Row, E.C.4 ; Edinburgh : 45 George Street. 7½ in. by 5 in. by 1¼ in. 276 pp. Price 3s. 6d. net.—Great accidents and disasters of any kind necessarily possess, by their dramatic nature, considerable power over the imagination, and railway accidents, for some reason not easy to explain, always attract a larger share of public attention than many others. We have sometimes thought that this may be due to the use of a fixed track for the vehicles, from which comes the impression of their moving inevitably to their fate in certain circumstances, such as a runaway. The author of this book has sought to bring together the facts concerning a certain number of accidents presenting features of more or less special interest, and he tells their story with a dramatic effect which holds the attention and makes for easy reading, though he contributes little to a knowledge of how greater safety can be obtained, technical matters being lightly touched on. We are assured, as we frequently are in general works on railway operation, that a signalman "could not cause a collision, even if he tried," but this hardly agrees with the rest of the book, much of which shows that he can cause one by mere forgetfulness, let alone trying.

The author deals at some length with certain well-known disasters, such as Abergele, Staplehurst, Tay bridge, Thirsk, Armagh, Dingle, Quintinshill, and, coming to more recent years, Abermule and Sevenoaks, and refers more briefly to many others, some in America and on the Continent. Some of the statements made are not accurate, however. For example, the train, which was carrying the old-fashioned train-staff, not a tablet, had practically nothing to do with the collapse of the Tay bridge, which was due to serious defects in its construction. The Court of Inquiry, before which witnesses were asked no fewer than 19,600 questions, found that the bridge was badly designed, constructed, and maintained, and must have collapsed sooner or later. Dickens could not have been travelling next to the engine at Staplehurst, as the first vehicle was a van and the next a second-class carriage. He was almost certainly travelling first class, and seems to have been in the third vehicle. Neither did all the remaining carriages topple into the river. The last four vehicles remained coupled on the embankment.

In the Armagh accident nobody was so stupid as to rely on "pebbles" to hold the detached vehicles. It was supposed that the rear brake had been put hard on, but was perhaps interfered with by passengers, who had no business to be in the van. Stones were used only as an additional precaution. At Thirsk the goods train did not come out of a siding, but stood at the main line home signal while the signalman was asleep. In the Abermule accident, far from there being "no sign of the driver" and the fireman searching for him, the latter said : "almost as soon as I got up I saw my driver was standing on the opposite side of the road." The author quotes from the "official report" certain words which are not to be found in Sir John Pringle's account of the accident.

There was, unfortunately, no "instant stampede" in the Dingle fire accident, or everyone would have got away. Most of the 29 passengers did walk safely off. It was those foolish enough to stop and watch who got caught. Neither did the booking clerk rush up the subway "leaving his cash behind him." The booking office was at street level and the clerk did not know anything was wrong for 10 minutes after the fire started, when he was asked to 'phone the powerhouse to cut off the current ; nor did he know there was a fire at all for another five minutes. The author describes some mishaps on the Glasgow subway, but no train could have been waiting at a signal between Bridge Street and St. Enoch as there were no intermediate signals, only platform starters. In his description of the Sevenoaks accident there is scarcely a single accurate fact.

We mention these points in no spirit of mere criticism, but to show how necessary it is to verify every statement in writing a work of this kind if it is to serve any really useful purpose to readers. If the author would do this for a second edition he would have the opportunity of contributing something not only readable, as this book is, but of practical use in studying the accident problem. The plain facts make quite dramatic enough reading, and from them alone can we draw satisfactory information towards improving conditions in future.

South Wales for Industrial Developments.—An attractive coloured folder calling attention to the merits of South Wales for factory sites has been published by the Great Western Railway.

Snows of France.—From the French Railways National Tourist Office we have received a holiday guide entitled "Snows of France." The cover of this publication is one of the most ingeniously designed we have yet seen ; it is white, and faintly ridged to represent snow, while from one side to the other boldly sweep the tracks of a pair of skis—which actually are to be found in miniature glued to the cover edge. Headed "Hints for the Budding Champion," a few words are devoted in the first place to what to wear, how to choose and take care of skis, and what accessories to take. Encouraged by this, the amateur, having first learnt "the art of eating at 5,000 feet," can then plunge into "the ski-er's vocabulary," which he is exhorted to commit to memory in the train. The facilities, attractions, and accommodation for winter sports in the resorts of the French Alps, Haute Savoie, Savoie, the Dauphiny, Provençal Alps, the Pyrénées, the Vosges, the Jura, the Massif Central, and even Algeria, are described and illustrated. A list of youth hostels is also supplied.

Ball and Roller Bearings.—A clear thumb-index is a useful feature of a new catalogue received from the Hoffmann Manufacturing Co. Ltd., Chelmsford. This enables the user to turn at once to the specifications and diagrams relating to any of the numerous types of ball and roller bearings described in the publication, and also to a section of tables showing fit allowances, limits of accuracy, B.S.I. symbols, metric conversions from inches to millimetres and *vice versa*, and other important information. Correct selection of bearings is facilitated by an introductory section, with numerous diagrams, on calculating loads. This catalogue lists a larger number of types and sizes of bearings than any previous edition.

Switchgear.—The range of Ironclad switchgear described in this illustrated catalogue from the General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2, has been extended to include additional control and protective appliances such as enclosed and earth leakage circuit breakers, air thermostats, small transformers, and similar equipment. Among the switches are push-button types, gate switches for lifts, and limit switches to prevent overtravel of cranes, hoists, and machine tools. Starters for d.c. and a.c. motors are also listed, together with switchboard accessories such as busbar chambers and fuseboards. Ironclad equipment complies fully with Home Office factory regulations, and I.E.E. regulations, and conforms to B.S.S. Nos. 124 and 88 as regards carrying and rupturing capacity.

THE SCRAP HEAP

A pineapple plant is now fruiting in the open at Torquay. It is growing on a rubbish heap in a garden on the Marine Drive, and has sprung from a discarded piece of a cutting potted up a year or so ago. The plant has three tiny fruits and has grown rapidly in the mild climate, although the potted cutting still remains quite small.

* * *

ASTROLOGERS WANTED

Statisticians are rapidly becoming a discredited race in the City. They can demonstrate with their usual facility that a share is sound value for money. The sequel to the discovery is almost certain to be a further fall in the price. One of the leading members of the tribe said to me last week: "Statistics don't help any more. The job of preparing brokers' circulars should be handed over to the astrologers."—*From the "Sunday Express."*

* * *

For 31 years Bill Hawker served as a machinist in the shops of the Canadian National Railways at Edmonton, Alberta, and during the whole of this period he wore the same black hat. Recently he retired on pension, and the famous hat was raffled. It was secured by Harry Neate, a fellow machinist, who now has it hanging above Bill's old bench.

* * *

EFFECT OF FROZEN WATER TROUGH

During the recent frost ice thrown up from a frozen water trough by a northbound L.M.S.R. train between Derby and Leicester broke some of the windows of a Manchester to London express.

* * *

GERMAN POST STATISTICS

The German Post Office carried 6,500,000,000 letters during the year April 1, 1936, to March 31, 1937. This is an increase of 12 per cent. over the figures for the previous 12 months. The number of telephone calls within the Reich during the last statistical year amounted to 2,600,000,000, 5 per cent. increase over the previous year.

* * *

Herr Ludwig Terdina, one of our readers in Vienna, wrote to us recently as follows: "My attention has been attracted by the illustrations of railway tickets possessing historical interest which have appeared in your paper from time to time, as I possess a ticket of 1919 that is certainly a curiosity. When Italy occupied Austrian territory in the autumn of 1918 the Italian railway authorities made the stocks of tickets left behind in the stations available for further use by cancelling the German wording and using the blank reverse face. Thus my ticket, originally Austrian, is printed on one side in German for the journey from Pola to Wiener-Neustadt, and on the other for the section (now Italian) from Trieste to Longatico (now Logatec in Jugoslavia).

"THE RAILWAY TIMES" IN THE RAILWAY MANIA

It is a coincidence that within a week or two of the centenary of our oldest weekly constituent—*The Railway Times*—a correspondence in the columns of *The Times* should have given prominence to Leech's caricature "Waiting for *The Railway Times*." This water colour, which was, of course, based on B. R. Haydon's famous painting "Waiting for *The Times*," was reproduced in our issue of October 29 last. The *Railway Mania* produced another, and less well known, cartoon of *The Railway Times*, which we reproduce here. It appeared originally in *The Illustrated London News* of November 8, 1845, in the course of an article written and illustrated by Alfred Crowquill, which said: "A single newspaper has swollen, and swollen until it has become large enough to cover your garden; you have your supplement No. 1, supplement No. 2, supplement No. 3, and last, though not least, a supplementary supplement. Post-office guards jump with all their Royal weight upon the bags, but they refuse most decidedly to be conveyed in the usual way, in the coach boots, before and behind; bag after bag is borne to what can't carry them, looking like a real representation of the sham 'Miller and his Men,' until at last the Royal Post-office omnibuses are forced into the service, and they are carried to the rails that are the cause of their dreadfully swollen appearance, and conveyed to their destination. This is gradually growing to such a frightful extent, that, very soon, if you venture to buy a newspaper, you must take a cab to carry it home, and stop at home a week to read it!"

"The Railway Times" as it appeared to a cartoonist when enlarged during the Railway Mania

* * *

BALLOT BOXES ON SOVIET TRAINS

By order of the Soviet Government, polling stations are to be provided on long-distance trains for passengers who are certified electors, to record their votes at the general election for the Supreme Council of the U.S.S.R., which takes place on December 12. Ballot boxes will also be provided in all hospitals for the convenience of patients, other than those suffering from infectious diseases.

* * *

A new conductor on his first day out was asked by a passenger for a certain place. Looking at his fare list he found the fare was 1s. 2d. Finding he had no tickets to this value, and not knowing what to do, he stood on the step to think it out. A sudden brain wave took him and he went to the passenger and for the 1s. 2d. fare he gave a shilling ticket and two penny timetables.

* * *

Asked which he thought would be better—the electrification or dieselisation of a given section of line—the superintendent replied that, in his view, the existing steamification met all the needs of the case.

* * *

Amsterdam, October 4.—The king has confirmed the Statutes of the Dutch Iron Railroad Company. A proposal to prolong the railroad to Rotterdam, by way of Leyden and the Hague, was unanimously agreed to.—From "*The Railway Magazine*" of *November*, 1837.

Set of stamps, depicting historical and modern locomotives, issued in connection with the Austrian steam railway centenary **(see pages 908 and 921)**

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

SOUTH AFRICA

Revenue Records

Two further revenue records have been created during October. The previous record of £692,349 was set up in the week ended December 1, 1936. The earnings for the week ended October 2 totalled £713,718 and for the week ended October 16, £695,332.

Cost of Living Conference

The Minister of Railways has announced that he proposes to call a further conference on November 15 for the purpose of receiving representations on the cost of living, which the associations desired to make at the conference in June, as recorded in THE RAILWAY GAZETTE of July 30, but which had to stand over until the housing position had been inquired into. Every effort will be made at the forthcoming conference to arrive at a reasonable basis for a "family budget" bearing in mind the standard of living in urban areas.

Narrow-Gauge Lines

An investigation is being made into the question of narrow gauge lines in the Union. When the investigation is completed the administration will consider the practicability of converting such lines into standard gauge, each case being dealt with on its merits. Consideration is also being given to the possibility of running a main line to South West Africa through Keimoes and Kakamas.

Cots for Infants

Experiments with portable folding cots for infants have proved so successful that the administration has decided to include them in the normal equipment of the majority of trains. A nominal fee will be charged.

INDIA

Railway Member's Speech to Conference

After Sir Maurice Brayshay's presidential address to the Indian Railway Conference Association [summarised in our issue of November 5—ED., *R.G.*], the Honourable Sir Syed Sultan Ahmed, Member for Commerce and Railways, addressed the session. He referred briefly to the Bihta derailment and its serious loss of life, but pointed out that during the five years ended 1936 only one passenger in every 50 millions carried in India had lost his life in accidents to trains.

In connection with the Wedgwood Report, he urged the speeding up of passenger and goods services, and the improvement of relations with the public. Though his hearers might not agree with the comment that railways were the most unpopular institutions in India, he thought they must all realise that there was something wrong with their methods that this idea should be prevalent. They must secure the goodwill of the public they served, and this was possible only by giving the service the public had a right to expect, and giving it with courtesy.

Increased Operating Costs Expected

After restating the greatly improved financial position of the railways, the Member for Commerce and Railways uttered a warning that caution was necessary in future estimates, because of the unsettled international situation and the fear that Japan might be unable to take her usual quantity of cotton, and also because the coal situation gave cause for anxiety. The prices of almost all materials, including coal, would affect working expenses, and the need for economy continued to be most pressing.

Turning to the subject of road competition, Sir Sultan Ahmed said he thought he could discern a growing recognition by responsible elements in India that the present state of affairs —forcibly condemned by the Wedgwood Committee—was not in the best interests of the country, and that control and regulation of road transport on a rational basis was desirable. He hoped that the contemplated legislation would help to eliminate unhealthy competition and foster a healthy development of road transport as a necessary and valuable part of land transport generally.

EGYPT

Serious Breaches in Lower Egypt

A very severe storm accompanied by thunder and lightning broke over Lower Egypt on the evening of October 27, with the result that the Cairo—Suez direct line was washed away at km. 90 between Suez and Gabal Oweibid, and also between km. 27 and 30, between Ein Shams and El Rebeiqi. So great was the damage that the line is not expected to be fit for traffic for two weeks, as in parts the track was carried away 5 km. from its correct alignment. The main line between Cairo and Port Said also was severely damaged between El Tell el Kebir and El Mahsama. In consequence, the evening express from Port Said which is due to reach Cairo at 10.35 p.m., did not arrive until 11.30 the following morning. Moreover, early on that morning, the line was washed out between Gineifa-Fayed and Serapeum, between El Ismâ'îlia and Suez, and between El Mahsama and Abu-Sweir on the main Port Said line. The track suffered further minor damage between El Hammam and El Gharbaniyat on the Western Desert line, and in the Cairo area at Palais de Qubbeh and between El Maasara and Helwan.

Loans to Staff

The Railway Board, at its meeting of November 2, sanctioned loans to be made to the staff in deserving cases, for those whose salaries do not exceed £E.20 a month, up to a maximum of one month's salary, which loans must be repaid within a year by deductions from salary. These loans are to be free of interest.

BRAZIL

Rêde de Viação Paraná-Santa Catharina (Estrada de Ferro São Paulo—Rio Grande)

Generally prosperous conditions in the States of Paraná and Santa Catharina enabled this railway to register successful working results for 1936. Receipts were as follow:—

	Contos
Passengers	6,175
Luggage	1,895
Animals	1,243
Goods	34,810
Miscellaneous	6,488
Road motor services	1,075
Total	51,686

In addition, special surcharges realised 4,819 contos, to be employed exclusively in general improvements, and the total collected for the Staff Pension Fund amounted to 1,139 contos.

Expenses totalled 50,468 contos, made up as follow:—

Administration	6,035
Traffic	10,833
Locomotive	23,394
Permanent Way	9,541
New works...	144
Road motor services	521
Total	50,468

From the balance of 1,218 contos, 26 contos must be deducted for allocation to capital account of the Paraná Railway, and the result, added to the results of previous years, gives a total surplus of 10,246 contos since the Government took over this line in 1930.

Under the Special Improvements Fund account, various works were carried out at a cost of 9,924 contos, the principal items being 2,469 contos for stone ballasting; 3,562 for the conclusion of the Paranapanema branch, and 1,975 for the construction of the Barra-Bonita-Rio de Peixe branch line.

Passengers increased by 213,284 as compared with 1935, due, principally, to the institution of excursion tickets at cheaper rates, and baggage went up by 2,055 tons. Animals decreased by 20,140 head, but general goods increased by 150,946 tons, or 16 per cent., timber taking first place with an increase of 9 per cent.

Timber Traffic

The timber industry forms the basis of the economical wealth of the States of Paraná and Santa Catharina, and

although output increased daily, exploration was guaranteed for many years, because a great part of the territory was covered by excellent forest reserves. However, although timber constituted the major portion of the railway's traffic, and contributed a very appreciable sum towards receipts, it was, nevertheless, a hindrance, rather than a help, to the progress of the railway, as, transported in the main over long distances, with 90 per cent. of the wagons returning empty, receipts from this traffic did not cover the cost of transport. This was proved by the fact that although timber represented 50 per cent. of the railway's traffic, it contributed towards receipts only to the extent of 26 per cent. An increase in the freight, especially on timber for exportation, was suggested as a remedy for the situation.

Due to the loss of the River Plate market, matte, a good freight-paying product, declined considerably, receipts under this heading suffering still further as a result of road competition, which, however, has been counteracted to some extent by the railway road motor service.

Coffee production increased steadily in the north of Paraná, but without advantage to the railway, as against transport costs amounting to $127 (reis) a ton-km. receipts were only $113 (reis) for the same unit. The benefit of cotton, already planted in this region, had not so far been felt.

Horticultural Products

In the area served by the line from Ponto Grossa to União da Victoria, a distance of 264 km. the production of potatoes, cereals, wax, and honey, had developed considerably. Further south, in Santa Catharina territory, where development up to 1930 had been retarded by fanatical insurrections and constant bandit raids, a surprising wave of progress had been noticeable, European fruits (especially grapes) and cereals, being cultivated on a large scale. The abundance of maize had made pig breeding and lard production a flourishing industry.

Road motor services between Curityba, Joinville, and São Paulo, had fulfilled expectations, justifying an extension to Paranagua and Antonina.

Engineering Works and Rolling Stock

During the year, 650 km. of line had been relaid, and repairs to, and strengthening of various bridges, to permit of heavier loads, had been put in the hands of contractors.

Six new Mikado type locomotives, purchased from the Berliner Maschinenbau A.G. (vormals Schwartzkopff), were put into traffic during the year, as also 120 closed wagons purchased from the Société Metallurgique de Enghien Saint Eloi, together with 6 composite guard's, postal and baggage vans, and 3 restaurant cars, purchased from the Companhia Edificadora. As it had not been possible to raise further funds, a contract had been signed with the Société Anonyme Energie, established in Marcinelli, Belgium, for the acquisition, and payment over a long period, of rolling stock to the value of 25,000 contos.

SWEDEN

Private Railway Results

During 1936 the various Swedish private railways carried an aggregate of 34·1 million passengers, an increase of 2·5 per cent. compared with 1935 and obtained passenger receipts totalling 36·9 million kr. (an increase of 3·2 per cent.), of which nearly 8 million kr. were from the omnibus services extending over a route mileage of 4,900. The aggregate goods traffic increased from 18·9 to 19·9 million *tonnes* and the goods receipts were 78·1 million kr. The total receipts were 123·1 million kr. against 116 million kr. in 1935, and the working expenses totalled 94·6 million kr. against 90·8 million kr. After all charges had been met the net revenue was 8·9 million kr. Electrified lines totalled 220 miles.

FRANCE

Further Increase in Fares and Rates

A further increase of 25 per cent. in fares and freight rates on French railways is to come into force on January 1, 1938. This decision is due to the constant growth in the railway deficit. The expansion of the debt has been accelerated by the application of the 40-hr. week, and the consequent employment of more than 60,000 additional railway workers.

The demand of the railwaymen for a rise in wages and allowances on account of the higher living costs, following the devaluation of the franc, has been granted, and the national budget will provide fr. 600 million for that purpose. The men, however, are also asking for a revision of the statute governing their promotion, and if this is granted, it may involve a further expenditure of fr. 2,000 million.

M. Georges Bonnet, Minister of Finance, estimates that the increase in fares will reduce the railway deficit from 8,100 millions in 1937 to 4,700 millions in 1938. His optimism, however, is not shared by M. Pomaret, *rapporteur* of the railway budget. M. Pomaret believes that the deficit may exceed 12,000 millions and points out that the 600 millions or possibly 2,000 millions required to meet the increased wage schedules, are not included in the estimates.

ALGERIA

Co-ordination of Transport and Closing of Lines

In order to co-ordinate rail and road services, the following railway lines have been closed to all traffic: Bouira-Aumale; Algiers-Koléa and the branch line to Castiglione; Algiers-Rovigo and the Ain-Taya branch; Dellys-Boghni; Orléansville-Ténès; and Trumalet-Hardy. In addition, the following lines will be closed to passenger traffic: Ouled-Ramoun-Tébessa and branch line from Oulmen to Khenchéla; Bone-la Calle; Mostaganem-Trumelet (by Relizane, Prévost-Paradol and Tiaret); Béni-Saf-Tlemcen; Arzew-Demesme; and Macta-Mostaganem.

Garratt Repeat Order

The working of the Garratt engines has been so successful that four more have been ordered. Moreover, the administration of the State Railways has just received a twin set of articulated Renault cars, with which a fast service will be maintained between Algiers and Oran, and Algiers and Constantin. A pneumatic-tyred Michelin has also been ordered and delivery is expected at an early date.

SWITZERLAND

Federal Railways 1938 Budget

The Administrative Board of the Swiss Federal Railways met at Zurich on October 14 for a discussion of next year's budget, the main points of which are as follow:—

Traffic receipts are estimated at fr. 323·5 million, or 15·8 per cent. more than in 1936. This is based on the increase which took place during the first eight months of the present year, but the fact is stressed that further improvements are by no means certain.

Working expenditure is expected to be 5 per cent. higher than in 1936, the increase being mainly due to increased cost of supplies, additional services provided, and the fact that salary reductions are to be attenuated as from January 1, 1938, by decision of the Federal Council (such reductions, however, will still produce a saving of fr. 12·8 million during 1938). The total working expenses are estimated at fr. 235·9 million.

The *profit and loss* account shows a deficit of fr. 31·6 million, as against 67·6 millions in 1936.

Construction Works

As regards construction, the principle laid down in 1933 will again be adhered to, namely that all expenditure under this heading must be covered by industrial and financial depreciations. Consequently, only works of the most immediate urgency are to be undertaken. Among the more important items may be mentioned the following:—

To be continued or completed: reconstruction and enlargement of Geneva and Neuchâtel stations, deviation between Berne and Wilerfeld (described in our issue of March 5 last), rearrangement of the passenger and goods lines between Basle and Muttenz, doubling between (*a*) Solothurn-Hauptbahnhof and Solothurn-West (including a new bridge over the Aare); (*b*) Emmenbrücke and Sentimatt (Lucerne), and (*c*) Pfäffikon to Lachen; also new electric signalling at Sargans.

New works to be begun include: electric signalling at the Alsace-Lorraine end of Basle (Swiss) station; provision of

separate passenger and goods tracks on the connecting line between the Swiss and German stations at Basle; and the first instalment of doubling the Flums-Mühlehorn section of the Zurich-Buchs main line. Other works under this heading include: automatic block signalling between Lausanne and Renens, and the closing of Malley intermediate block station; conversion of the old Hauenstein line to single track between Sissach and Olten; provision of an intermediate block station in the St. Gotthard tunnel; track alterations at Immensee, Arth-Goldau and Melide to permit of higher speeds through these stations on the Gotthard route; and alterations and improvements at a number of stations.

Rolling-stock will account for an amount of fr. 9·5 million, or fr. 850,000 more than in 1936. The Federal Railways rolling stock will comprise by the end of 1938: 390 steam and 498 electric locomotives, 63 railcar and trailer sets, single railcars and three-car high speed electric rakes; 147 light tractors for shunting and service purposes; 3,509 coaches (excluding those on the metre-gauge Brünig line); 656 vans; and 15,621 wagons.

POLAND

Opening of Sierpc-Brodnica Line

The official gazette, *Monitor Polski*, of October 25 announces that the Minister of Communications on October 24 opened the new railway from Sierpc to Brodnica, a distance of 55 km. Three stations have been built, at Szczutowo, Rypin, and Kretki. The new line will connect the Mazowsze district, including the towns of Plock, Sierpc, Plonsk, and Rypin, with the Baltic ports and with Warsaw. It will also appreciably shorten the distance from Warsaw to Gdynia, the route now being via Nasielsk, Sierpc, Brodnica, and Laskowice. When the bridge over the Vistula at Plock is completed it will reduce the distance also from Lodz and the Dabrowa coal district.

TURKEY

Important New Programme

The Turkish Parliament has sanctioned the expenditure of T£16,000,000 during the next four years on railway works, principally on rolling stock and shop equipment. During each of these four years, 20 to 30 locomotives, 30 to 40 passenger vehicles, and 300 to 500 goods wagons will be acquired, so that when, in 1940—according to present schedules—Erzerum is linked with Istanbul and Ankara by the extension from Sivas, 122 locomotives, 22 postal vans, 172 passenger carriages and 3,900 goods wagons, all of new construction, will be available. Of these totals, a German consortium has already received orders for 30 locomotives, 22 carriages and 200 wagons.

It is intended that the present repair shops at Sivas shall be greatly enlarged to undertake the extensive repair and construction of goods stock up to a total of 2,400 major overhauls or new wagons by 1941. But during the next four years about 1,000 new wagons will have to be purchased abroad, and the budget for the fiscal year 1937-38 makes provision for the acquisition of 200.

ARGENTINA

Strike on Cordoba Central Railway

On November 3, the strike which had seriously disorganised the traffic working on this line since the middle of October came to an end. As reported in these columns a few weeks ago, a section of the staff had been agitating for the suspension of the wage-cuts in force since 1932. As the company was unable to accede to this demand, some of the men took the law into their own hands and, without the authority of the Central Committee of the *Union Ferroviaria*, declared a partial strike throughout the line. As announced in THE RAILWAY GAZETTE of August 13, this trouble was temporarily settled by the Government undertaking, at its own expense, to raise the wages to their old level until September 30, pending the sanction by Congress of the purchase of the line by the State. As nothing was done in this direction, however, the Government's intervention in regard to the wage-cuts lapsed on the date mentioned, when the deductions were re-established, to the discontent of the men, who thereupon declared a partial strike of two hours a day (one hour in the morning and another in the afternoon) as from October 15, the stoppage being increased by two hours a day until a maximum of 6 hours *per diem* was reached, 3 in the morning and 3 more in the afternoon. Although the strike was, in theory at least, only partial, the fact that the hours chosen for the stoppage varied in different zones, added still further to the dislocation of the service.

The representatives of the railway and of the *Union Ferroviaria* were each granted an interview by the Minister of Public Works, who, after listening attentively to their respective points of view, informed both parties that, before any negotiations could be entered into with the Government, the strike must be called off and the service restored to normal. According to an unconfirmed press report, the deputation from the *Union Ferroviaria* suggested to the Minister that a possible solution to the difficulty might be found in the leasing of the railway by the Government, pending the sanction by Congress of the purchase of the line. It is stated—again unofficially—that this course was discussed by the Minister of Public Works and the Director-General of Railways with the President of the Republic, but was dismissed as not being feasible while the purchase of the railway was awaiting the decision of Congress. Finally, on October 20, the company was ordered by the Government to take the necessary steps to normalise its services within 48 hr. It was reported that a similar situation was threatening on the Entre Rios and Argentine North Eastern Railways, the management of which was advised to adopt the measures necessary to avoid any interruption to the services.

The note issued by the Ministry of Public Works commented in very severe terms on the men's high-handed action in declaring a strike—in contrast to the patient attention given to the matter by the Government, which had shouldered the burden of restoring the wage-cuts for a period of three months—in spite of the fact that these deductions had been established in accordance with agreements signed by the railwaymen's unions and the companies before the Director-General of railways, and afterwards ratified by the Presidential Award of October, 1934, which the men repudiate.

As the men completely ignored the Government's order and the strike continued, a settlement by mutual agreement appeared impossible. Accordingly, the Government issued a Decree stating that, as a result of negotiations between it and the company, an agreement had been reached under which the State Railways would work the Cordoba Central line for a period of one year, and guarantee the company similar net profits to those that accrued in 1936-37. The purchase option was left open, and it was arranged that if this was ratified by Congress, the amount guaranteed would be increased to provide for an interest charge of 4 per cent. on the sale price. The Decree also stipulated that the unions must abide by the wages and working conditions ruling on the State Railways, this being tantamount to a restoration of the salary and wage cuts.

The Strike Extends to Other Lines

Fears that the movement might extend to the Entre Rios and Argentine North Eastern Railways were realised on October 28, when the personnel of these two lines initiated a stoppage of one hour in the morning and a similar period in the afternoon, seriously disorganising the services. As reported in THE RAILWAY GAZETTE of August 27, the wage-cuts on both these railways were temporarily suspended, until the results of working during the last financial year were known; a provisional arrangement which did not satisfy the majority of the men, who demanded that the deductions be cancelled for good, a concession which the present financial situation does not permit the companies to make. The strike on the Entre Rios and Argentine N.E. Railways, like that on the Cordoba Central, has not been officially recognised by the Central Committee on the *Union Ferroviaria*, whose action in the matter has been confined, so far, to endeavouring to find some way out of the difficulty that will save the faces of its obstinate members before the trouble assumes more serious proportions. [The latest

information reporting the strike settlement was published in our news columns last week.—ED. *R.G.*]

UNITED STATES

Completion of Elimination of Railways from Street Level, West Side, Manhattan Island

In THE RAILWAY GAZETTE of August 6 last, the principal features of the second stage in the New York Central West Side Improvement Scheme were described—this scheme comprising the removal of all railways from street level to either above or below that level—and mention was also made of the third stage, in which the freight line running at ground level through the streets below 64th Street was to be placed in a cut-and-cover under Riverside Drive and gardens. This third stage has now been completed and was officially opened on October 12.

Some 2½ miles of multi-track railway has now disappeared under a steel framework carrying a super-highway for four lines of road vehicles for part of that distance, and covered over by public gardens with grass and trees for the remainder. The completion of this stage brings to a close the great work of eliminating railways from streets in the west side of Manhattan Island.

Continued Traffic Decline Feared

The President has summoned Congress in extraordinary session for November 15, with the purpose of having it enact a Wages-and-Hours Bill (prescribing minima), and also to reorganise the administrative departments of the Government in a manner, so critics charge, which would permit the executive to dictate policy to such independent quasi-judicial bodies as the Interstate Commerce Commission. The railways are exempt from the proposed wages-and-hours legislation, but they fear the effect of prolonged discussion of these mooted questions on the production of their customers, and hence the volume of traffic that may be offered for transport.

As a result of wage increases granted in the face of declining traffic, the railways have been forced to retrench sharply in their maintenance programme, and from the middle of August to the middle of September railway employment declined by approximately 30,000. In addition, improvement programmes have been suspended, and the Pennsylvania Railroad is holding in abeyance the purchase of 17 lightweight, stainless steel coaches which it proposed acquiring.

Items Making for a Brighter Outlook

Meantime, despite the temporary darkness of the railway outlook, not all is gloom by any means. The train service employees, having secured a substantial increase in wages, are less likely to press ardently in Congress for the passage of their 70-car-train-limit Bill; and, moreover, the railways by advertising and publicity have succeeded in building up a considerable public opinion against the enactment of this threatening "make-work" measure.

Also, the Pennsylvania Railroad announces that the electrification of its freight line from Morrisville (Trenton, N.J.) to the Harrisburg freight line, and both freight and passenger lines from Harrisburg to Philadelphia and Washington, will be completed several months ahead of schedule, midsummer, 1938.

There have been several orders for small quantities of new rolling stock, among them being those of the Chicago, Burlington & Quincy for 11 stainless steel passenger cars, five locomotives, and some 1,500 freight cars. Funds for the purchase of new rolling stock are still plentiful and can be obtained in the New York market on favourable terms at interest rates from 2¼ to 3 per cent.

NIGERIA

Practically 20,000 Railway Employees

The following table, reproduced from the *Nigerian Transport Services Monthly Bulletin*, shows the total staff and employees engaged on the Nigerian Railway, open lines, as at June 30, 1937.

	European staff	African and West Indian staff	African employees	Labourers and porters	Total
Civil Engineering	96	106	2,086	9,196	11,484
Workshops and Running	135	311	3,470	1,348	5,264
Traffic and Commercial	43	1,106	691	571	2,411
Administration, Accounts and Stores	33	370	96	140	639
	307	1,893	6,343	11,255	19,798

The mileage of the Nigerian Railway is 1,767 miles 3 ft. 6 in. gauge, and 133 miles 2 ft. 6 in. gauge, 1,960 miles in all.

CHINA

Signalling

On the Peiping-Tientsin section of the Peiping-Liaoning (Peking-Mukden) Railway, where there is a heavy passenger traffic, speeds up to 80 km. (50 miles) p.h. are now permitted, and correspondingly the signalling system has been revolutionised. At each of the 16 stations on this 140-km. section of line, there are now two signal boxes, one controlling each end of the yard; complete with electric interlocking and automatic train staff equipment. This new installation has been introduced since last year at a cost of $700,000.

On the Canton-Hankow Railway the Ministry has taken measures to equip the whole 1,096 km. of line, with its 100 stations, with the minimum requirements of a mechanical signalling system, from the British Boxer Indemnity Fund, at a cost of a further $700,000.

On the Lung-Hai Railway also the two-cabin system is installed at over 100 stations, and the electric staff system has been in force for the past three years.

Recent Purchases of Locomotives

Railway	Number of new locomotives delivered	Type	Year
Canton–Hankow	4	0-8-0	1935
,, ,,	8	4-8-4	1935
,, ,,	16	4-8-4	1936
Peiping–Hankow...	10	2-6-2	1935
,, ,, ...	10	2-6-2	1936
Lung–Hai* ...	5	2-8-0	1935
,, ,, ...	10	2-8-0	1936
,, ,, ...	15	4-6-2	1936
Nanking–Shanghai	2	2-6-2	1936
Kiaochow–Tsinan	4	2-8-2	1935
,, ,,	4	2-8-2	1936
Kiangsi-Nanking...	4	2-8-0	1935
,, ...	1	4-6-2	1936
Chekiang–Kiangsi†	4	4-8-0	1935
,, ,,	4	2-4-4	1935
,, ,,	6	2-8-2	1936
,, ,,	2	2-8-0	1936
,, ,,	8	2-8-2	1936
Tientsin–Pukow‡...	10	?	1937
Cheng–Tai‡ ...	4	?	1937

* Fourteen more to be delivered in 1937.
† Ten more to be delivered in 1937.
‡ Delivery expected.

To meet the rapidly-growing demand for traction, the above locomotives were purchased for the various railways.

The Treatment of Sleepers

In accordance with the recommendations of the Hammond Report, the Minister of Railways has decided to establish two sleeper-treating plants, one at Wuchang and the other at Shanghai; the former is already partly constructed. At Shanghai, Oregon pine and native sleepers from Fukien Province will be creosoted, half the creosote supply being available from the gas plant in that city. A railway Forestry Department, sawmills and branch lines to them are also contemplated. Steel sleepers are considered prohibitively costly.

U.S.S.R.

Traffic Figures

The route length of the Soviet railways at the end of 1936 was 52,870 miles, during that year a total of 483,200,000 tons of freight and 991,600,000 passengers were carried. The average daily wagon loading was 86,200, a figure which it is anticipated will be increased to nearly the 100,000 mark by the end of this year.

COMING-OF-AGE OF THE MITROPA

A brief survey of developments with sleeping and dining car services in Central Europe

By LIONEL WIENER

NOW that twenty-one years have elapsed since the formation of Mitropa, it is interesting to recall the circumstances which led to its inception, and to retrace the policy to which it owes its development. A cursory glance at pre-war conditions in Germany reveals how indispensable it was that some sort of unification should take place, as both sleeping and dining car services were run by too many different entities. There were three principal sleeping car companies, of which the International Sleeping Car Company, and the Prussian-Hesse Railways Administration ran most of the services; and no fewer than five dining-car companies, of which the two most important were the International Sleeping Car Company again, and the Deutsche Eisenbahn-Speisewagen Gesellschaft (the German Railway Dining Car Company), controlled by the former. The others, such as the Nord-West Deutsche Speisewagen Gesellschaft (North-West German Dining Car Company) formed by a group of station restaurant owners, were far less important. Thus, at that time, the International Company alone maintained as many as 8 *trains de luxe*, 62 sleeping, and 136 dining car services.

When the war broke out, the company's rolling stock was sequestrated, its contracts rescinded, and negotiations started between the various German railway administrations for handing them to a new national company, in which it was soon decided to include Austrian and Hungarian interests. Under the leadership of the Dresdner and Deutsche Banks, the new concern was floated on November 24, 1916, and registered on January 6, 1917, under the name of Mitteleuropäische Schlafwagen und Speisewagen Gesellschaft (called for short, Mitropa) to maintain such services in Germany, Austria, Hungary and, eventually, in other parts of Europe as well. The Mitropa was invested with the sleeping and dining car contracts previously held by all the other companies operating in Germany, with the sole exception of those of the Prussian-Hessian administration.

Early Development

The Mitropa began operations as from January 1, 1917, running the former International and German Railway Dining Car Companies' services. By May, 1917, all the others with the exception quoted above had also been taken over, as were those operating in Austria, Hungary, and the occupied territories; these were maintained with the 255 cars the company then possessed. Outside Germany, the company's cars ran from Berlin to Charleville on the Western front, and eastwards to Constantinople, to Bucharest-Craiova, and to Brest-Litowsk Alexandrowo, also from Wilna to Warsaw, &c. But with the withdrawal of German troops after the Armistice, all these services had to be curtailed, and so much so that in the leanest days of 1919 as few as 8 Mitropa dining cars were kept running.

On May 3, 1920, occurred the constitution of the German Reichseisenbahn Gesellschaft, which was to help future arrangements to a considerable extent. This company soon acquired a controlling interest in the Mitropa, and henceforward participated not only in all technical and commercial questions, but also in directing the Mitropa's policy. The Mitropa thus had the advantages of company management without sacrificing its close connection with the railways of the Reich and with the Government.

In 1920, also, the Mitropa contracts with the Austrian and Hungarian railways were invalidated in favour of their former owner the International Sleeping Car Company, who also demanded, (*a*) the restitution of 155 of its cars which had been sequestrated and which were in the hands of the Mitropa, and (*b*) the reinstatement of the German Railway Dining Car Company, whom it had previously controlled, and which had owned 116 cars. The matter was taken before the Mixed Belgo-German Arbitration Tribunal, whose award was promulgated on June 24, 1922. This award stated that the taking over of the German Railway Dining Car Company's 116 dining cars had been perfectly legal, but established a *distinguo* concerning the International Company; 39 of the dining cars running under contracts having repurchase clauses were also to be retained by the German Government, and 35 sleepers (of which 32 had already been returned); and 25 dining cars were to be returned to the International Company, and hire arrears were to be paid. Thus no less than 155 of the International Company's and its subsidiary's dining cars were acquired by the Mitropa.

1922 Sleeping-car Services in Germany

As this period (1922), both the Mitropa and the Reichsbahn were operating sleeping car services in Germany, and some of the Mitropa services were running into neighbouring countries—Austria, Holland and Scandinavia. They were apportioned between them as follows:—

	Reichsbahn		Mitropa	
	Number of services	Km. of railway	Number of services	Km. of railway
All-sleeping car trains	4	1,174	4	675
German sleeping car services	52	8,154	26	7,419
International sleeping cars services ..	—	—	22	971

It was therefore essential that arrangements should be come to between the three operating companies—the Mitropa, the Reichsbahn, and the International Sleeping Car Company.

Arrangements between the Companies

At the suggestion of the Reichsbahn, a conference between delegates of the two sleeping car companies was convened in London in July, 1924, and a convention apportioning zones of influence to each company was signed in Paris on April 23, 1925. The Mitropa retained all interior sleeping and dining car services, and part of the international traffic: north and south, from Scandinavia and Holland through Germany to Switzerland; west and east, to Austria (exclusive of routes passing through Czechoslovakia, but including those from Germany to the Czechoslovak spas such as Karlovi Vary, Marienské Lezné, and Franzensbad). These contracts gave it access to places as distant as Geneva, Lugano and Chur on the one hand, and Bad Gastein, and Vienna on the other.

The International Company retained its west and east *trains de luxe*, the Orient, Ostende-Vienna, and Nord Expresses; also the north and south international Germano-Swiss-Italian sleeping car services, and those to countries unreserved to the Mitropa, *i.e.*, from Germany to France, Belgium, Poland, the Baltic States and Czechoslovakia (save the exceptions quoted above). The Reichsbahn over whose lines the sleeping car services were to run, approved of these agreements with slight variations. The Inter-

national Sleeping Car Company was awarded ten-year contracts for such routes as the Mitropa did not work, and, as a security, it was further enacted that at the expiration of this period, these services would not be awarded to a different company within 8 years. It was also stipulated that the International Company was to place orders for 25 cars with German builders, and thereafter in numbers proportionate to the length of international lines operated. These arrangements are the basis of those that have since been made, but further alterations are bound to occur in the future, notably for the *trains de luxe*. Joint rolling stock or mixed rakes may appear.

The object of the 1925 contracts between the Reichsbahn and the Mitropa is twofold—to provide for equipment and finance. The Reichsbahn transferred to the Mitropa (in which, it should be remembered, it had a controlling interest) its own sleeping and dining car contracts. It also sold it 25 cars and hired it 57 old ones which the Mitropa was to modernise. Thereafter, the Mitropa was to hold the concern on lease, the capital to bear interest at 2 points above the Reichsbank's discount rate, this sum not being inferior to 5 per cent. of the value of the cars; at the same time, amortisation at the rate of 5 per cent. was proposed. The total value of the rolling stock was then some 5,000,000 M., annual payments to be 400,000 to 500,000 M. Besides these payments, the Reichsbahn should be entitled to one-third of the price of seats or beds, and to 25 per cent. of the dividends. Since then, it has still further increased its holdings, and now holds a very considerable majority of the shares.

These arrangements applied to the former Reichsbahn rolling stock; those applying to former stock of the International Company have been previously stated. By 1927, after ten years' existence, the Mitropa had some 600 cars maintaining 197 dining and 215 sleeping car services. In 1931, this number had reached 682 (315 dining and 367 sleeping cars) of which two-thirds were over twenty years old. The rolling stock has been systematically rejuvenated and now comprises 320 dining and 344 sleeping cars, which include the last word in car construction and maintenance. In the last decade, 227 new cars have been purchased. There are 54 further cars on order. In the present year there were 184 sleeping and 228 daily dining car services.

Mitropa Trains and Services

The Mitropa has run complete trains as well as dining and sleeping services, and development in both directions has been fairly steady until the crisis caused them to be curtailed. The car mileage increased roughly twofold between the years 1925 and 1930, when the crisis hit the country badly. Yet, by careful handling—service withdrawals here, others tentatively tried there—the number of car-kilometres fell but from 93 millions in 1931 to 83 in 1933, since when circumstances improved again, so that they reached 98 millions in 1936. At first, the Mitropa ran 5 all-sleeping car trains, but there now remains only one, from Berlin to Munich. The company also instituted three day *trains de luxe*, two of which were short lived. The Berlin—Hook of Holland Express (L 112/111) was inaugurated on December 2, 1922, so as to provide quick and comfortable connections with the Harwich boats; and the Scandinavia Swiss Express (L 92/91) ran in connection with the Baltic ferries from Warnemünde and Sassnitz, to Rostock, where the two rakes joined, and thence continued to Kassel, Frankfort and Basle. Both were short-lived, but for quite a time Mitropa saloons were included in the Berlin—Hook of Holland FD trains (112/111) just as Pullmans of the International Company are in the Golden Arrow train today.

The third of these *trains de luxe* had a better fate, and unlike the two foregoing, is world-renowned. This is the Rheingold Express (FD 102/101), which first ran from Amsterdam (and Hook of Holland) to Basle on May 15, 1928, following the right bank of the Rhine, the route of the obsolete Amsterdam Swiss Express. This magnificent train originally comprised 6 to 8 saloon cars weighing, van included, some 440 to 500 *tonnes*. It was then the only FFD train, but as for all other *trains de luxe*, second class carriages have been included, and since May 15, 1936, it has become an ordinary FD train. It still competes with the International Company's Edelweiss, which runs from Amsterdam to Basle via Brussels and the left bank of the Rhine, in more or less the same time, though this route is slightly longer.*

By 1933, the Mitropa maintained 131 sleeping car services, 50 of which ran into neighbouring countries. In 1936, this total, including 58 international services, reached 156 runs maintained with 184 cars. Their length ranged from 294 km. (Berlin—Hamburg) to 935 (Berlin—Magdeburg—Basle). As in Great Britain, the extra sleeping car fare is charged on a nightly (not a kilometrage) basis, and is, usually, 25 RM. first class, half as much second, and a quarter third class (6·25 RM.), or, if sheets are provided, 8 RM. Services to Southern Germany are a little higher. A useful sideline is the hiring of cushions, the number of which reached 600,000 last year.

Mitropa catering activities have not been limited to the running of dining cars, though these are, of course, its main objective. Anything touching refreshments is within the company's scope. The dining car services have been considerably developed, and practically all expresses (both D and E trains) are provided with them. Besides this, Mitropa dining car services have been extended abroad. The Dutch services run *via* the Oldenzaal, Zevenaar, Nymegen and Venlo, frontier stations, to Amsterdam, Hook of Holland and Flushing. Out of 1,353 km. of Dutch lines having restaurant car facilities, 440 have Mitropa services only; 545 those of the International Sleeping Car Company only; and 368 those of both companies. In Switzerland, Mitropa dining cars are restricted to the metre gauge routes which had been unprovided for by the International Sleeping Car Company. From 1928, they have run on the Bernina Railway St. Moritz-Tirano line, and shortly after on the Rhaetian Railway St. Moritz—Chur line, the former with and the latter without special four-wheel kitchen car attached. The Alp Grüm station buffet is run, at 2,189 m. above sea level, in connection with the cars.

Catering for special trains, such as those of the "Strength through Joy Association" (*Kraft durch Freude*), has become quite an important item. In five years the number of specials has more than tripled, and reached 1,775 in 1936. Besides an average of 288 dining cars run daily in 1936, vans with kitchens have been provided, and have averaged 58 a day. Light refreshments are supplied in all sleeping cars, and light meals are served in 10 railcar rakes as against 3 in 1935. The Mitropa maintains station restaurants (as in Frankfort), and a catering department on river steamers, both on the Danube (Donau Dampfschiffahrts Gesellschaft) and on the Havel (the Elite Company). Rather an unexpected direction in which the company's activities are displayed, and with considerable foresight, is the provision of meals on board aircraft of the Deutsche Luft Hansa and the Oesterreichische Luftverkehrs Gesellschaft. At the same

* The Rheingold covers 777 km. to the Basle Reichsbahn station, and takes, with 13 stops, 10 hr. 30 min. going, and with 12 stops only on the return journey, 10 hr. 35 min. The Edelweiss takes 10 hr. 14 min. (with 11 stops) going and 10 hr. 23 min. (12 stops) returning over its 817-km. route. The best overall speed therefore works out at 73·4 km.p.h. (45·6 m.p.h.) for the Rheingold, and 79·8 km.p.h. (49·6 m.p.h.) for the Edelweiss.

time, it runs restaurants in the Berlin (Tempelhof), Vienna (Aspern) and Budapest (Mátyásföld) airports, and on the Berlin—Vienna, Berlin—Amsterdam and London air liners.

The Mitropa service specialises in those small attentions which complete the passenger's comfort. Classes in dining car technique are given by experts to batches of 15 to 25 of the staff at a time, and the results have come up to expectations. The Mitropa, unlike the International Sleeping Car Company, has no travel agencies of its own. The branches of the Mitteleuropäische Reisebureau represent it, and private agencies sell its seats and berths.

The financial results have necessarily suffered when economic conditions were bad, particularly during the company's early growth. The war, the inflation, the occupation of the Ruhr (when some of its cars were detained), the years of economic disorganisation, the money stabilisation, and the crisis, all had to be borne, and recurring difficulties overcome. From 1925 to 1929, receipts improved from 30 to 45 million RM., only to fall to 25 in 1933, the worst year. The Mitropa was obliged to reduce its fares by some 20 per cent. owing to lessened purchasing power, but the loss thus incurred has been offset by better patronage. Six to seven per cent. of gross earnings have always been earmarked for car depreciation, and when receipts were lower, as from 1931 to 1933, this percentage was increased. Owing to the greater wear at higher speeds, amortisation has been further increased in 1936, to 1,654,252 RM. In the same year, the cars that the Mitropa had hired from the Reichsbahn since 1926 were finally purchased, hence a further increase of 2,472,552 RM., in the value of the company's rolling stock, the capital by this time, reaching nearly five times its original value. Older cars are either scrapped or modernised, their pleasing appearance owing much to the interior decorators who are responsible for their design.

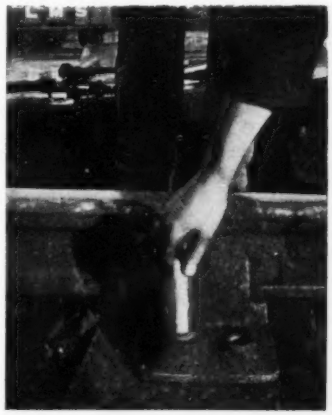
AN EFFECTIVE SLEEPER FASTENING

A TROUBLE with which the permanent way maintenance engineer is faced is that of keeping sleeper fastenings secure. With the increased speed and weight of modern trains this difficulty has been aggravated, and not only in track that has been down for some time but also often in new track. Even the present standard coach screw fastening has proved under certain arduous conditions not to have been sufficiently permanent.

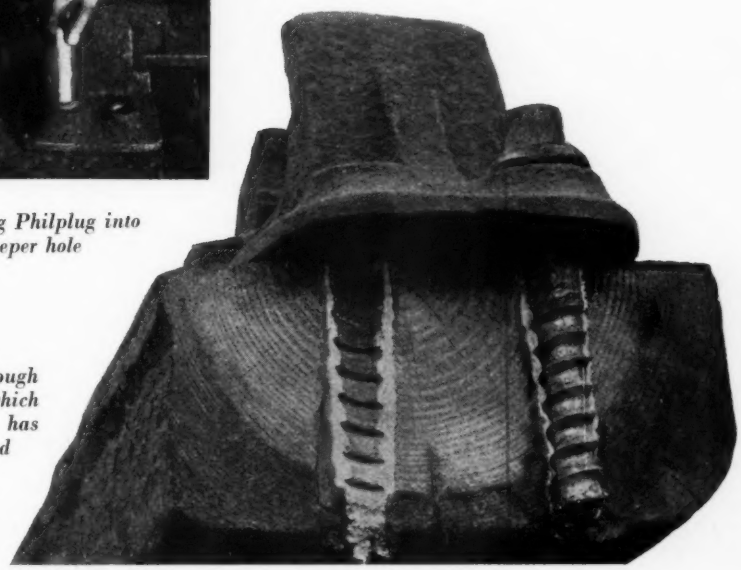
When sleeper spikes or screws work loose, the most common practice to correct the trouble is either to fill the hole with a wooden plug and rebore, or to move the sleeper a few inches so as to get a new fastening altogether for the spike or screw. The former seldom lasts very long and the latter costs much time and energy.

Recently there has been placed on the market a plastic asbestos material, Philplug (manufactured by Philplug Products Ltd., Aintree Road Works, Perivale, Greenford, Mdx.), designed to overcome the trouble economically and effectively. This material, which is covered by world-wide patents, is manufactured from a special grade of asbestos fibre so treated that it acts as a de-oxydising agent and prevents corrosion taking place on the embedded portion of the screw or spike. It is supplied in dry fibrous form, and, to render it plastic for introduction into the sleeper hole, just sufficient water is added to cause the fibres to bind together. Although it is introduced into the hole in a plastic state it hardens under pressure, and thus the driving of a screw or spike immediately consolidates it sufficiently to enable it to take the full load immediately. The material contains an abrasive powder which under the pressure exerted bites into the screw or spike and effectively locks it into position. As it is introduced in a plastic state the driving of the screw or spike causes it to fill the hole completely, irrespective of size or shape and equally to cover the whole surface of the screw or spike. The side thrust on the fibres of the sleeper is thus evenly distributed. Further, the hole in the bottom of the sleeper is completely sealed, so preventing water from seeping upwards, and the screw or spike is insulated from contact with the sleeper, thus preventing the rotting action that otherwise takes place. The fastening, being of asbestos, is claimed to be everlasting, even under the most adverse conditions existing in the tropics, and is unaffected by moisture, heat or frost once it has been compressed in the sleeper. It is inert and neither contracts nor expands. Being of a semi-resilient nature shock loads do not cause it to crack.

Philplug was first tried experimentally a couple of years ago on one of the British main-line railways, since when its successful service has been recognised by all the other British railways which are now using it (with the exception of the Great Western, which uses only through bolt sleeper fastenings).



Inserting Philplug into sleeper hole



Section through sleeper in which Philplug has been used

INDIAN RAILWAYS AND THEIR COMPETITORS

A survey of the position as the result of a recent return to India and a forecast of the future trend of events

By Major-General Sir HENRY F. E. FREELAND, K.C.I.E., C.B., D.S.O., M.V.O., late R.E.

WHEN the writer reached India last December, after four years' absence, he became aware that the railways were not only not holding their own against road competition but the position was rapidly growing more serious. He was told that it was of no avail the railways endeavouring to drive the buses and lorries off the roads and that we must put up with our losses. The answer, of course, was that, if the railways could not pay the interest on the 800 crores of rupees (£600 million) sunk in them, the deficit would inevitably be found out of the proceeds of additional taxation, for all, or nearly all, this huge sum has been raised by Government loans and is not shareholders' money as in the case of English railways. It was obvious that railways must fight back. How could they do it?

The volume and nature of the road offensive were due to two main causes. Railways had cut their commercial staff too low, under stress of a policy of retrenchment, and had lost touch with their public, and there was, and still is, delay in placing a control over the indiscriminate operation of road transport, whose methods are justly described as "chaotic."

The Indian Railway Inquiry Committee under the chairmanship of Sir Ralph Wedgwood was touring India at the time of the writer's visit, and it became evident from the nature of its questions that there would be "no bouquets handed out to the railways." Nevertheless it was felt that the recommendations of this committee would emphasise the need of an early increase in the commercial staff and the adoption of greater publicity and advertising. Therefore, long before the committee's report was public property, railways had their officers and canvassing inspectors out in the districts regaining touch with the traders and travellers, ascertaining their needs. There is, in fact, a big drive in progress to stop the loss of our earnings and regain at least some of the traffic lost. The results of the earlier effort have been promising, and as far as passenger traffic is concerned a considerable improvement has been effected. The additional commercial staff has, however, hardly got into its stride, and it may be prophesied with assurance that there is much more to come. Furthermore, it is not only the commercial staff that is exercising itself actively in the matter of increasing our earnings, but *all* those engaged in transportation at stations or on trains. As an example, a guard's running room cook in his spare time canvassed for and obtained sufficient passengers to fill a special train for a local fair and thereby added a considerable sum to the earnings of his station. And so, in many ways, railways are discovering that new conditions exist in India. As in the rest of the world there is a spirit of increasing bustle and hurry; speed of movement is demanded now as never before. Road transport has come to stay; with all its "door to door" advantages it will always be an active competitor with railways. Why not use them both in combination, each in its proper sphere, to provide and improve the communications in so vast a country, much of it totally undeveloped?

Roads are essentially pioneers, and with modern equipment they must replace light railways for opening up new country. The type and standard of road motor vehicles now carrying passengers and freight will not be tolerated much longer. The unrestricted destruction of lightly made roads and the uncontrolled and uneconomic competition of small owner-driver-mechanics with one another and with railways cannot be accepted as in the interest of the people or of the State. With the advent of legislation for a proper control, sound and well-financed road companies will come into being, and it is with them that railways must be prepared to associate and co-operate.

A great number of problems have arisen as a result of the investigations of the commercial staff, undertaken under a great variety of conditions. Shall railways own their road vehicles and operate them as an integral part of their organisation, or will it be better policy to make agreements with road motor companies to provide, maintain, and operate buses and lorries to feed the railways? If neither one nor the other is practicable, what type of train is required to move the different classes of traffic and how should it be run? Are railcars of any existing design better than light steam-hauled trains? If not, what design of steam locomotive is needed to haul light fast passenger as well as goods trains? Are the stations laid out and the signalling arrangements devised to deal with a much greater frequency of train movement than at present?

These and many other difficulties present themselves, and to overcome them will take a long time, a great deal of anxious planning and considerable expenditure. At least railways have aroused themselves from slumber; a good beginning has been made and organised co-operation with roads in the general interest is a definite possibility.

* A brief biography of Maj.-Gen. Freeland will be found on page 931.

High-Tensile Steel for Freight Wagons

The American railways have been trying for years to reduce the weight of freight train vehicles, being fully cognisant of the savings in transportation costs so made possible. Nevertheless, as was pointed out recently in our American contemporary, the *Railway Age*, now that materials are available for building lighter wagons, some railways are showing reluctance to use them. They are apparently disinclined to use high-tensile steel for the purpose, unless they can first be certain that immediate and direct savings will follow the introduction of vehicles so constructed on their own systems. But as the *Railway Age* points out, it should be recognised that as high-tensile steel wagons come into more general use, every railway will itself receive approximately as many vehicles as pass from its own lines to those of other companies, and the operating savings from lightweight rolling stock will then be distributed among all systems. In other words, it will be possible to achieve the operating economies that lightweight stock offers only by adopting policies that will put large numbers of such vehicles into service. It will thus be profitable for all the railways to build vehicles to specifications that will produce maximum savings, whether such savings are effected in maintenance or operation, or both, and irrespective of the mileage covered by the stock on the owning company's system.

A CENTURY OF STEAM TRACTION IN AUSTRIA

By EMERICH KARNER, Chief Mechanical Engineer, Austrian Federal Railways

WHEN the construction of the first steam railway in Austria was begun a century ago, passenger trains were already running in England, the mother country of the steam locomotive, at speeds as high as 80 and 90 km.p.h. (50 and 56 m.p.h.). There, the genius of Stephenson had been able to perfect the steam locomotive to such a degree that such speeds could be satisfactorily and safely maintained over considerable distances, and had given it a form which it retained without appreciable modification for a hundred years. As much experience with railway working and the construction of rolling stock was in consequence available in England it was natural that Austrian engineers should be sent there, and also to America, to study the railways and their equipment, and two were accordingly chosen, named Schönerer and Bretschneider. This resulted in an order being given to Robert Stephenson & Company for a locomotive of a type of which many were already in use in England, named *Austria*. It had four wheels, the rear pair, placed in front of the firebox, being driven by two cylinders. Its trial runs in Austria took place on November 12 and 14, 1837, between Floridsdorf and Deutsch-Wagram. Fig. 1 shows a model of the *Austria*, made from drawings supplied by Robert Stephenson & Company. The successful results of the trials led to further locomotives being ordered during the next three years, all from England.

In 1840, however, the workshops of the former Kaiser Ferdinands Nordbahn, managed by an Englishman named Baillie, began to build an engine, named *Patria*, and in the following year the first locomotive issued from the works of a railway that had been founded in the meantime, the Vienna-Raab line, from Vienna eastwards in the direction of Budapest. These works under the management of an engineer of world-wide reputation, John Haswell, later achieved great success in locomotive work, not only in Austria but in Europe generally. Both it and the later established Günther works at Wiener Neustadt (an industrial town near Vienna) often took the lead in new developments in locomotive engineering.

The configuration of the country in the old Austro-Hungarian monarchy, with numerous mountain sections,

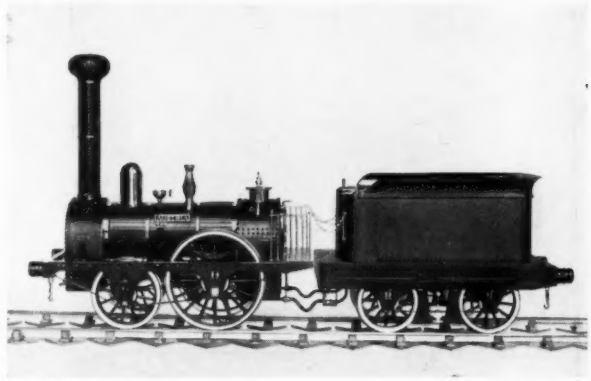


Fig. 1—Model of the first steam locomotive in Austria, the Stephenson-built "Austria"

caused locomotive work to develop along different lines from those elsewhere in Europe, the Alpine routes, such as the Semmering, having considerable influence on it. When the latter line was begun prizes were offered for a design for a locomotive able to haul a train weighing 140 tonnes over the Semmering pass at 11 km.p.h. (6·8 m.p.h.), the maximum gradient being 2·5 per cent. (1 in 40), the minimum radius of curves 190 m. (208 yd.). In addition to the Vienna-Raab Railway works and the Günther works, Bavarian and Belgian makers competed, and four locomotives were tried, the first and second prizes going to the foreign machines, the third to Haswell's locomotive, made at the Vienna-Raab shops. It speaks much for the farsightedness of this man that his design, which then came only third, was later used for mountain railways all over the world while the other two have been forgotten. Haswell for the first time applied to his engine, named *Vindobona*, the counter-pressure brake and later adopted axles free to move transversally, an arrangement developed further by Gölsdorf and widely used. The Semmering line also gave rise to the Engerth type of locomotive, the use of which spread to other countries. This type had a tender which carried part of the weight of the locomotive, making it very adaptable to sharply curved track (Fig. 2).

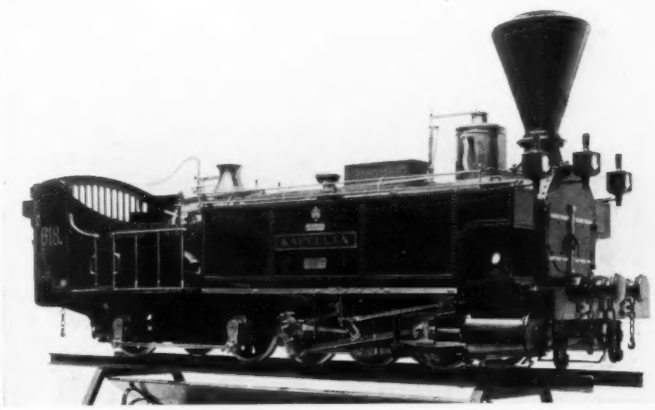


Fig. 2—Model of Engerth-type locomotive for the steeply-graded Semmering line

The difficult nature of the country was responsible for the development of the express locomotive being slower in Austria than in other European countries, although it was in Austria that several types of locomotives specially adapted for hilly and sinuous lines were evolved. To mention only two, there were the Steyerdorf and Duplex engines, turned out by the Haswell works. In the former the weight of the tender was used for adhesion, its wheels being coupled by a special arrangement to the rear coupled axle of the locomotive. The Duplex engine had four cylinders driving one axle and mounted outside the frames.

In Austria, as elsewhere in Europe, a movement towards locomotive standardisation appeared in the middle of last century. Most Austrian lines then favoured outside frames. The Austro-

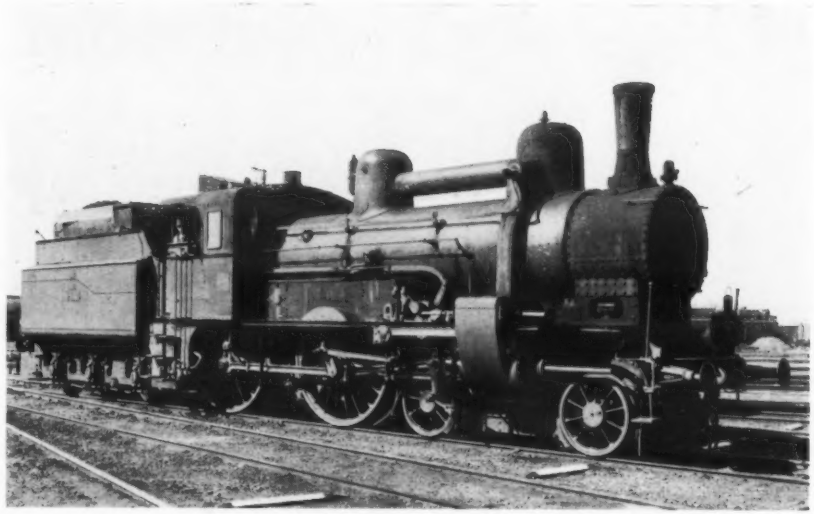


Fig. 3—An early 4-4-0 two-cylinder compound express locomotive designed by Karl Gölsdorf

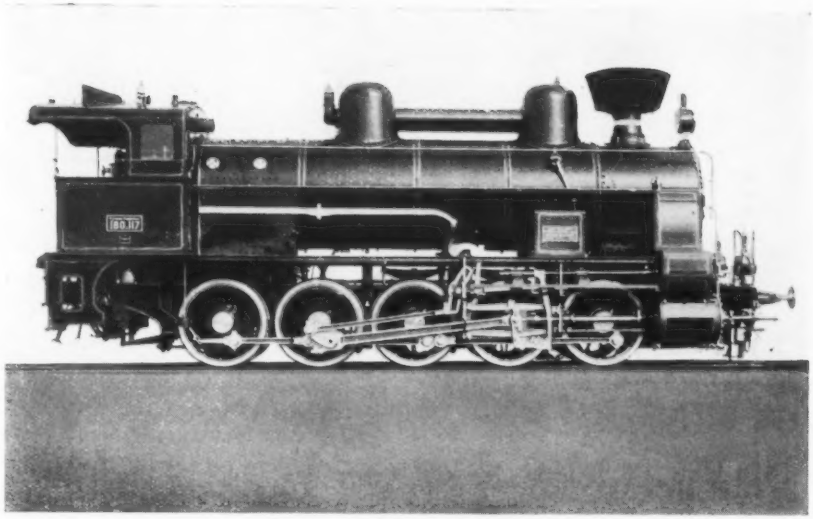


Fig. 4—Gölsdorf's famous 0-10-0 compound locomotive of the Austrian State Railways

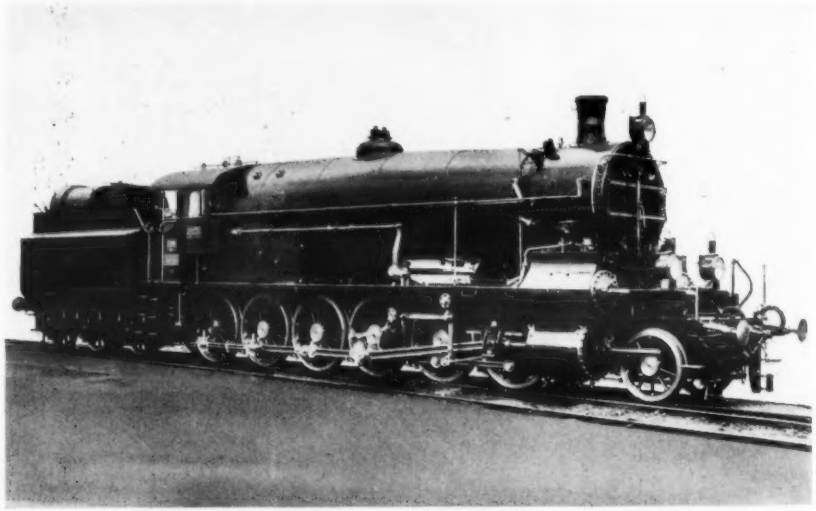


Fig. 5—Gölsdorf's 2-12-0 superheated four-cylinder compound engine

Fig. 6—A powerful post-war 0-8-0 shunting tank engine

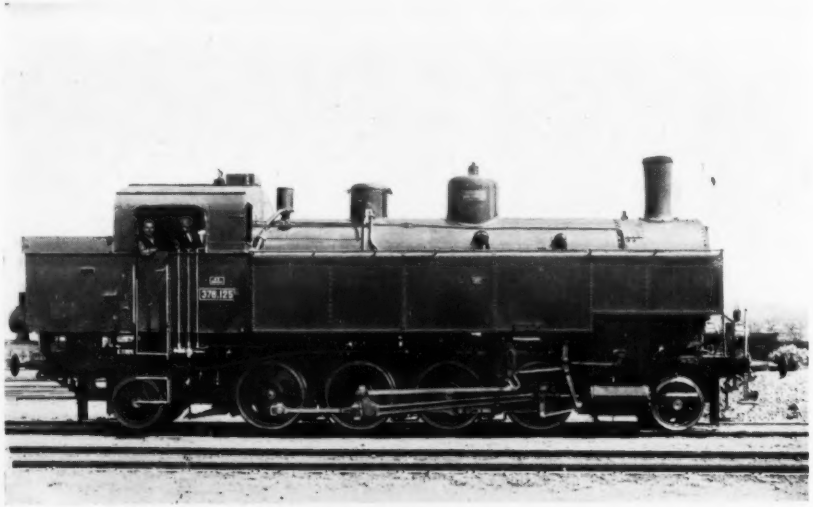


Fig. 7—A powerful 2-8-2 tank engine built after the war for lightly-laid lines

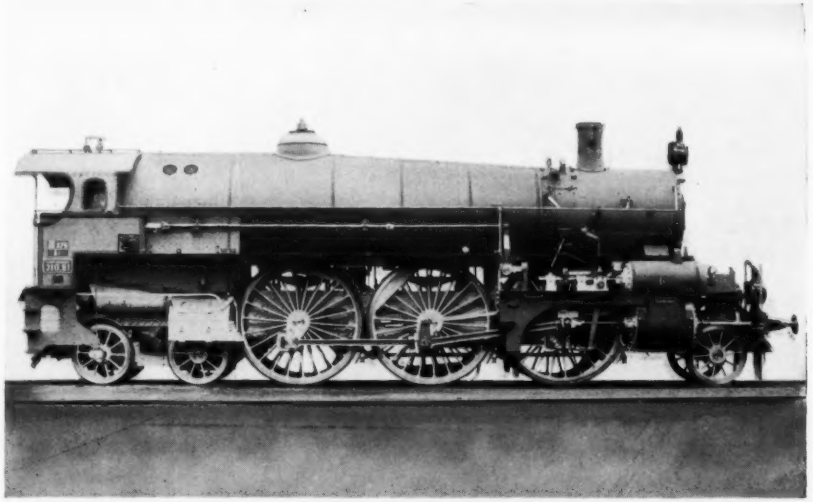


Fig. 8—2-6-4 express locomotive, the most powerful in Austria just after the war

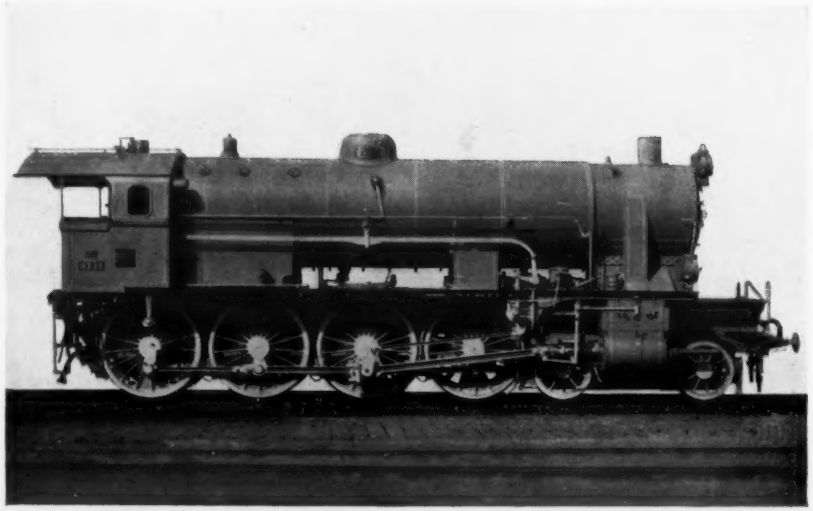


Fig. 9—4-8-0 two-cylinder superheated express engine introduced in 1923 for the Vienna-Salzburg service

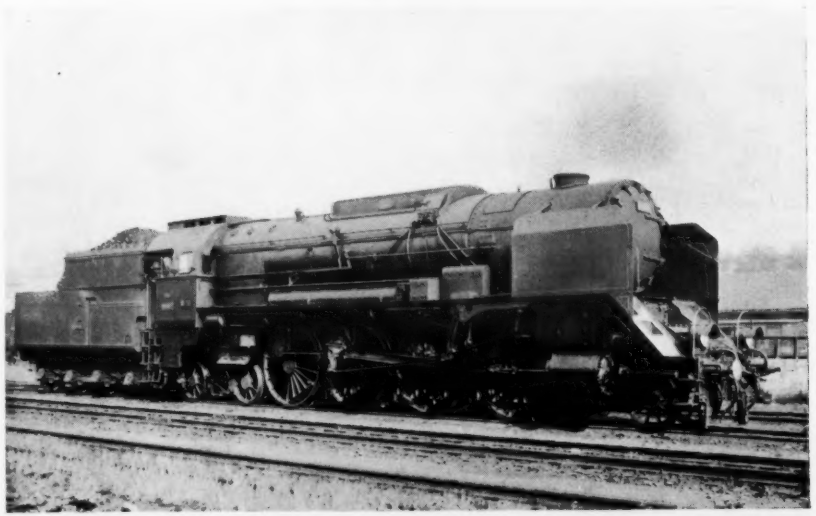


Fig. 10—A more powerful type than that shown in Fig. 9, a 2-8-4 built by the Wiener Lokomotivfabriks, A.G.

A CENTURY OF STEAM TRACTION IN AUSTRIA

Hungarian State Railway Company, a line whose works developed out of those of the Vienna—Raab line and which had always played a leading part in locomotive design, alone adhered exclusively to inside frames. Towards the end of last century it was first recognised that to obtain steady running at high speeds great overall length was necessary and no overhanging mass. Under Karl Gölsdorf's influence Austrian locomotive construction underwent a decisive change. The low-pitched boiler was given up for one raised well above the frames, and special attention was paid to the wheel arrangement and to the guided length of the engine. Fig. 3 shows a 4-4-0 compound express locomotive, class "6" of the State Railways, one of the first of Gölsdorf's, which soon set a fashion in Austrian locomotive design. It was fitted with a special starting device later used elswhere. His influence was very marked in Austria and engineers in other countries frequently followed his lead. Of the many designs he produced only two will be referred to here; they occupy a prominent place in locomotive history and are the 0-10-0 compound locomotive, class "180" of the State Railways (Fig. 4), and the 2-12-0 superheated 4-cylinder compound engine (Fig. 5). In the former, Gölsdorf made use of Haswell's idea of transversally movable coupled axles, enabling the engine to traverse curves of 150 m. (164 yd.) radius without binding. Gölsdorf was the first to make an engine as seen in Fig. 5. It can traverse the sharpest curves on the line without difficulty.

Gölsdorf greatly favoured compounding and developed it to such perfection that it could compete with the superheated method even at the beginning of this century. It was only the gradual development of superheating that at length brought about the abandonment of compounding in Austria. After Gölsdorf's death the superheated, single expansion two-cylinder locomotive was more and more adopted. Some 8- and 10-coupled goods engines appeared in which Gölsdorf's influence was plainly visible. After the war altered circumstances compelled a complete change in Austrian locomotive design. Many lines, previously of little importance, required more powerful and more efficient engines, the industrial districts along their routes having considerably developed. This led to powerful 0-8-0 shunting tank engines and 2-8-2 tank engines for lightly laid lines, of which many were built (Figs. 6 and 7).

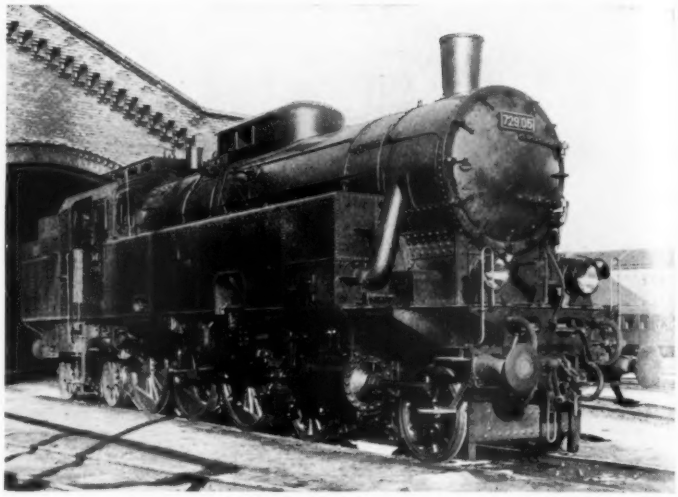


Fig. 11—New 4-6-4 superheated tank engine for light fast trains

Traffic conditions changed on the main lines too. Before the war the main current of traffic was north and south in the old monarchy, along comparatively level sections for the most part. After the war the position was the exact opposite, and suitable locomotives had to be constructed, as the most powerful hitherto were 2-6-4 express locomotives with 2,100 mm (6 ft. $10\frac{3}{4}$ in.) driving wheels (Fig. 8), which could not deal with the increased loads. In 1923 a 4-8-0 2-cylinder superheated locomotive appeared and was used for the Vienna-Salzburg service (Fig. 9), but this was soon found not to be powerful enough and therefore a 2-8-4 type was built by the Wiener Lokomotivfabriks, A.G. (Fig. 10). This is at present the most powerful and efficient Austrian locomotive and reached 155 km.p.h. (96·3 m.p.h.) on trial. Its power and capacity for speed enable it to meet any demands likely to arise within a reasonable period.* For hauling light fast trains a new 4-6-4 superheated, two-cylinder tank locomotive has been built and is now used on lightweight express services on various sections (Fig. 11).

The above gives a brief review of the development of locomotive engineering in Austria, and will also serve to show that new features are being introduced, so that the steam locomotive is by no means at the end of its evolution there. Although electrification of the western routes has reduced the extent of the steam-worked services, nevertheless this change and the building of heavy electric locomotives has given considerable impetus to the construction of more efficient steam engines, able to haul the heavy corridor expresses without loss of speed when they leave the electrified sections.

Fig. 12—An improved form of the 2-8-4 type shown in Fig. 10; this is the most powerful and efficient type of express locomotive in Austria

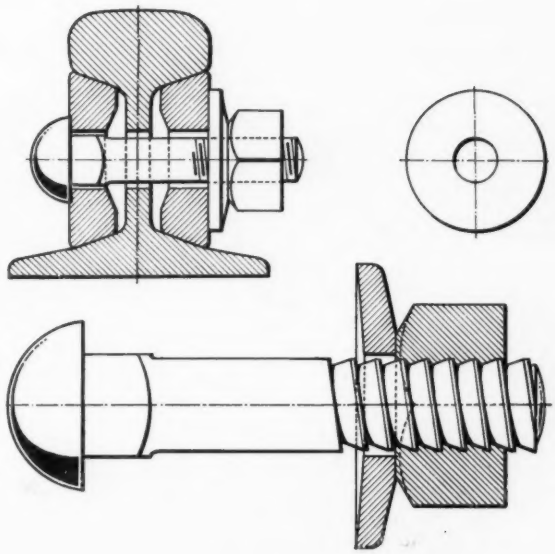
* A description of the latest improved locomotive (see Fig. 12) of this type appeared in THE RAILWAY GAZETTE of November 12

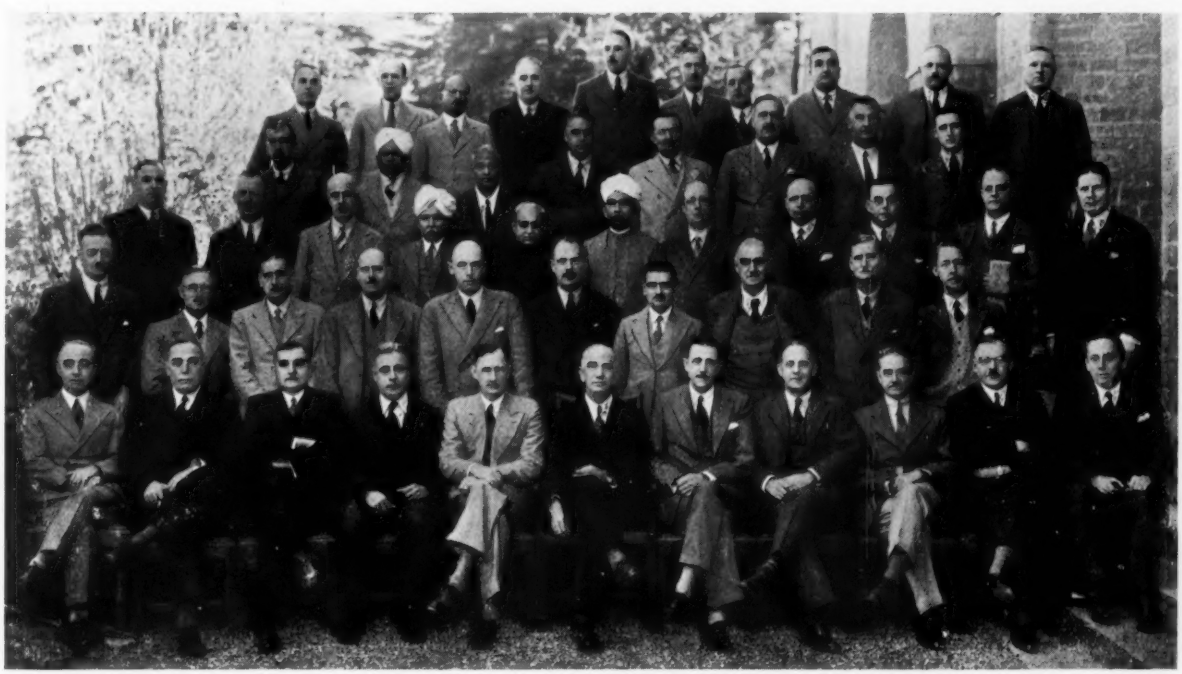
A NEW SWEDISH FISHBOLT

A NEW type of fishbolt has been perfected by a Swedish railway engineer, Colonel K. A. Lagergren, and in practice, it has proved to be most satisfactory in reducing screw-offs to a small fraction of what they are with ordinary bolts. A special terrace-cut thread is used, which produces increased frictional resistance to forces tending to screw off the nut.

Not long ago a special committee was appointed by the Swedish State Railways to investigate ways and means to reduce the abnormal number of loose fishbolts in the track. During a test period of 20 months, the committee found, in some cases, that nuts had to be screwed up as many as three times. Of ten ordinary fishbolts, the normal percentage of "loosage" was found to be 56 per cent. This stands in sharp contrast to the figure of 1·6 per cent. in the case of Lagerman's terrace-threaded nut and bolt. Of 64 samples of this type tested over a period of 20 months, only one was found to have become loose, presumably because of a flaw in the material.

The new unscrewable bolt connection can be tightened by means of an ordinary key. It has been the object of favourable comment in Germany and is protected by Swedish and several foreign patents. Its inventor and developer, Colonel K. A. Lagergren, is the builder of the Swedish East Coast line.





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***Indian Railway Conference Association*, 1937**

L.N.E.R. LOCOMOTIVE No. 10000

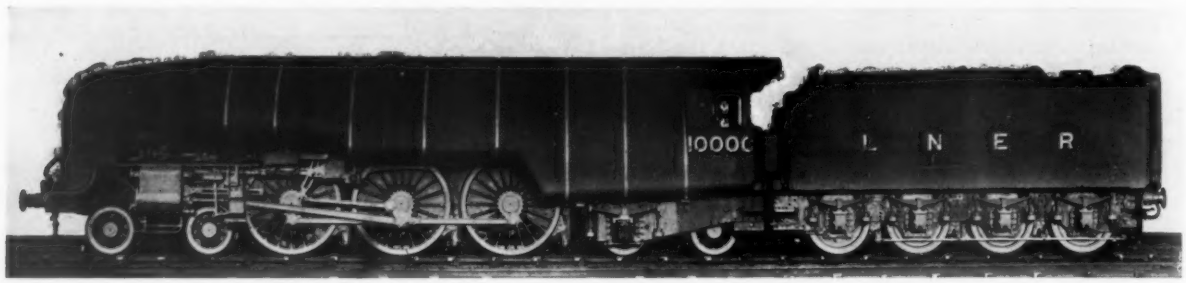
Now in service rebuilt as a three-cylinder single-expansion engine

LOCOMOTIVE No. 10000, of the L.N.E.R., originally built as a four-cylinder compound at the Darlington works of the company, has recently been converted at the Doncaster works to a three-cylinder simple engine. It was originally fitted with a Yarrow-Gresley water-tube boiler carrying a working pressure of 450 lb. per sq. in., and was the first 4-6-4 express passenger engine to be built for an English railway.* No. 10000 was located in the North Eastern Area, and was principally engaged in the running of express trains between York and Edinburgh. On occasions it worked the non-stop train from King's Cross to Edinburgh and proved to be a powerful, fast and free running engine.†

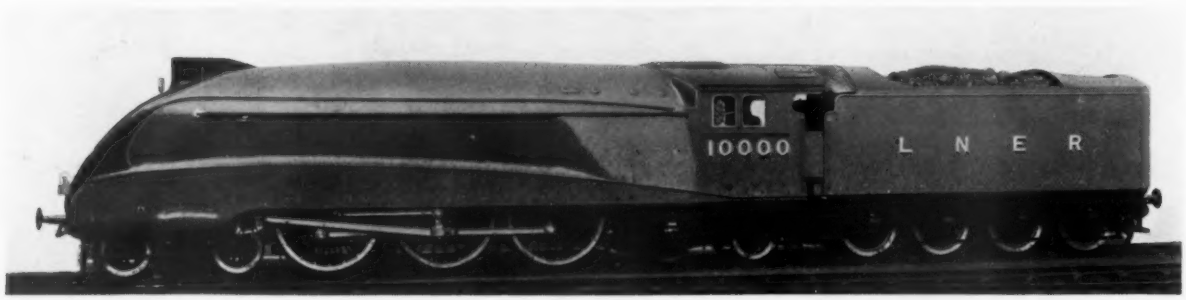
Notwithstanding the use of high steam pressure, coupled with compounding, the engine did not prove economical in coal consumption, and as it was burning considerably more coal than the L.N.E.R. standard Pacifics, it was

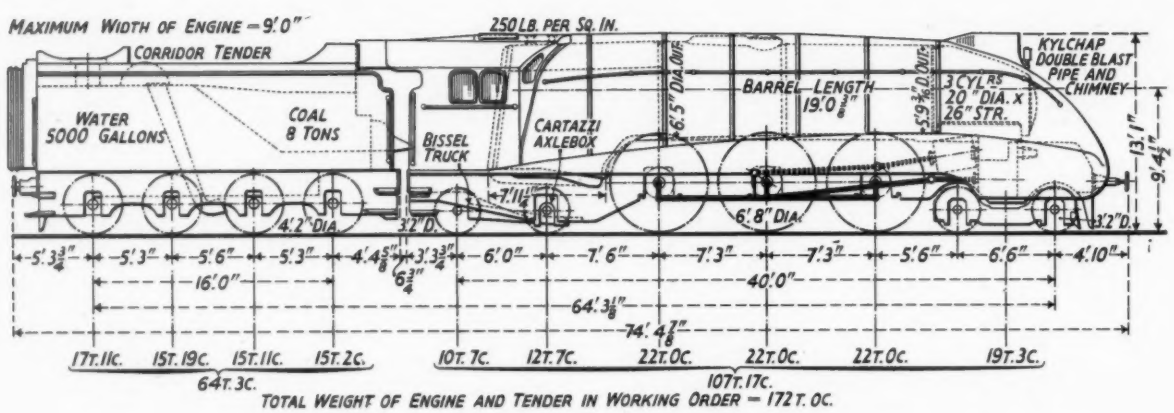
* As the carrying wheels at the rear end are not connected in the form of a bogie, it may by some be considered more correct to term the wheel arrangement 4-6-2-2

† The issue of THE RAILWAY GAZETTE of January 30, 1931, contained a fully illustrated article describing the engine as originally built. This included a folding plate with sectional elevation, plan and cross-sectional drawings



Engine as originally built in 1929. Four-cylinder compound, water-tube boiler, 450 lb. pressure





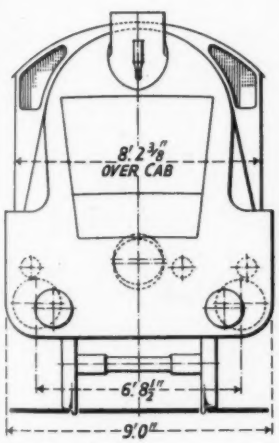
Engine as rebuilt this year at Doncaster works with three single-expansion cylinders, 250 lb. pressure

decided to substitute a boiler of the type used on the 2-8-2 " Cock o' the North " class engines, but with a pressure of 250 lb. per sq. in. Whilst the tractive power of the engine, as converted, is the highest of any six-wheeled coupled express passenger engine on the British railways, it is not as great as that of the engines of the " Cock o' the North " class.

The boiler barrel has a maximum diameter of 6 ft. 5 in. and is 17 ft. 11¾ in. long between tubeplates. The firebox has a grate area of 50 sq. ft. Two 3½-in. dia. Ross pop safety valves are fitted, and set for a working pressure of 250 lb. per sq. in. The steam collector is a steel pressing integral with the dome, the steam supply being taken through a series of ½-in. slots cut in the top of the barrel plate. A regulator of the double-beat type feeds a 43-element Robinson superheater through a 7-in. diameter main steam pipe. The elements are of the short loop type and extend to within 9 in. of the copper tubeplate. The boiler is fitted with two injectors, a Davies & Metcalfe No. 12 exhaust steam injector on the right, and a Gresham & Craven 11-mm. live steam under-footplate injector on the left.

The three cylinders, 20 in. diameter by 26 in. stroke, are cast separately, and the exhaust from the outside pair is carried to the blastpipe base through passages in the cast steel saddle. The inside admission piston valves are of the narrow-ring type, 8 in. in diameter. Separate steam pipes, 5 in. in diameter, are fitted to each cylinder. The double blastpipe and chimney are of the Kylchap pattern, with 5¼-in. dia. blastpipe tops. Nickel chrome steel is used for the connecting and coupling rods, which are similar to those fitted to the company's Pacific type engines. The whole of the revolving, and 40 per cent. of the reciprocating, masses are balanced; the revolving masses at the centre crank are balanced by extensions of the crank webs. Standard practice is followed in the valve gear, the outside valves being operated by means of Walschaert gear and the inside ones by the Gresley gear. The maximum cut-off is 65 per cent., at which position the valve travel is 5¾ in.

The coupled axleboxes are lubricated by means of a Wakefield six-feed mechanical lubricator, and Armstrong oiler pads are used in the axlebox trays. A Wakefield mechanical lubricator also lubricates the valves and cylinders, through one feed in each steam pipe, and one to the top of each cylinder barrel. The two lubricators are driven from one return crank on the right hand trailing crank pin. Four oil boxes, each with nine syphon feeds, lubricate the valve spindles and piston rods.



End view of engine as rebuilt, showing location of the three cylinders

The locomotive is fitted with vacuum brake apparatus. The two 27-in. diameter brake cylinders are arranged to transmit their load to one main shaft, and give a total braking power equal to 93 per cent. of the adhesive weight. The reversing gear is of the vertical type, fitted with ball thrust washers, and a vacuum locking device is provided. Bowden wire is used for the sanding gear and cylinder cock controls, as well as for operating the whistle (situated immediately in front of the chimney). Bucket seats are provided for the driver and fireman, and a flexible rubber roofing is fitted over the gap between the cab and tender. In addition to the usual cab fittings, a Flaman speed indicator and recorder is provided. A turbogenerator, carried at the front end of the engine, supplies electric current to the headlamps, also to a number of lamps placed under the skirting and between the frames in order to facilitate engine examination. Lamps are fitted in the cab to illuminate the water and pressure gauges, and the speed indicator. When running at night, the coupled wheels and motion can be floodlit. All wiring is in steel conduits and the switchbox is located under the driver's seat. The following is a brief comparison between the 4-6-2 A4 standard Pacifics and engine No. 10000:—

	A4 type	No. 10000
Boiler pressure	250 lb. per sq. in.	250 lb. per sq. in.
Total evaporative heating surface	2,576·3 sq. ft.	2,597·6 sq. ft.
Superheater:—		
Number of elements	43	43
Heating surface	748·9 sq. ft.	748·9 sq. ft.
Total heating surface	3,325·2 sq. ft.	3,346·5 sq. ft.
Grate area	41·25 sq. ft.	50 sq. ft.
Cylinders (3) dia.	18½ in.	20 in.
Piston stroke	26 in.	26 in.
Tractive effort at 85 per cent. boiler pressure	35,455 lb.	41,437 lb.
Total weight:—		
Engine	102 tons 19 cwt.	107 tons 17 cwt.
Tender	64 tons 3 cwt.	64 tons 3 cwt.

The tender is of the eight-wheeled corridor type, fitted with Pullman vestibule and Buckeye coupler, and is equipped with a water scoop. It carries 5,000 gallons of water and 8 tons of coal. The engine and tender are completely streamlined, and painted in Garter blue similar to the " Dominion " class engines working the Coronation trains of the L.N.E.R.

Farthest North

Several claims have been made recently for the most northerly railway in the world, among them one on behalf of the Seward—Fairbanks line in Alaska. At its most northerly point, where it crosses the Tanana river before entering Fairbanks, this line lies at a latitude of 64° 59′ N., and thus is well north of the White Pass & Yukon Railway, which, beginning on the Pacific seaboard at Skagway, runs north for 110 miles to Whitehorse, at 60° 42′ N., or approximately 50 miles north of the latitude of Oslo. In Europe, the Ofoten section of the Norwegian State Railways attains a latitude of 68° 26′ N. at Narvik, or about 250 miles nearer the Pole than the Alaskan railway. The Ofoten line forms the Norwegian portion of the Lapland iron ore railway running from Luleå, on the Gulf of Bothnia, to the Arctic Ocean at Narvik, and the most northerly part of the Swedish section lies at virtually the same latitude as Narvik. In the same vicinity there is a still more northerly railway, the Murmansk line of the Soviet railways, completed during the war by British forces, and which at the port of Murmansk is in latitude 68° 59′ N., approximately 38 miles north of the latitude of Narvik. This line is in process of electrification, and the present electric terminus is at Kirov, about latitude 67° 15′ N. For the last two decades this line has been able to claim the most northerly point reached by any railway regularly worked, but it now yields to a newly-opened isolated line in Siberia, the most northerly point of which lies in latitude 69° 4′ N. This railway is 60 miles long, and runs a little south of east from the port of Dudinsk, on the River Yenisei, to the copper, nickel and cobalt workings round Norilsk, on the River Piasina. All the above railways except the Canadian one run north of " sixty-three."

A NEW RAIL LUBRICATOR

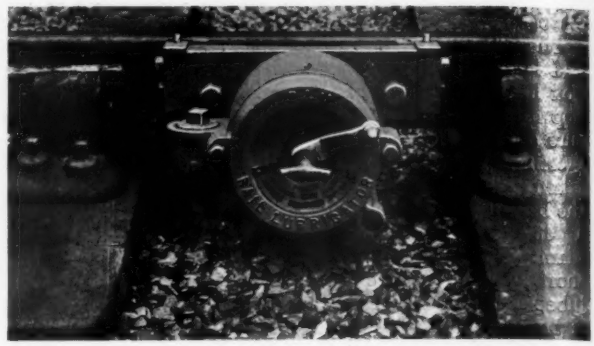
An ingenious new lubricator for reducing the side wear of rails

THERE has been placed on the market by the P. & M. Co. (England) Ltd. a new positive-feed rail and flange lubricator, specimens of which we have recently seen in service on the London Midland & Scottish Railway. This lubricator is strong yet simple and can be fitted to either bull-head or flat-bottom rail. It is positive and automatic in action and operates with every passing wheel. The lubricant used is a graphite grease which is pumped from a main container, by the action of the passing wheels, through orifices in a greasing plate to the gauge side of the rail head. The apparatus is fitted on the straight in advance of a curve, or the first of a succession of curves, to be lubricated. In the case of the specimen lubricators inspected by us we found little or no grease on the preceding straight, but the gauge side of the rail head on the curve itself was well spread with a layer of graphite grease, none of which had got on to the top of the rail. The lubricant was being deposited where required.

This type of lubricator has certain obvious advantages, in addition to its automatic and positive action. It is not affected by weather, acting equally effectively over a wide range of temperatures running down to much below zero, and, being watertight, it is impervious to rain. A single lubricator provides ample grease for a succession of curves and no additional attachment, such as a length of check rail, is required.

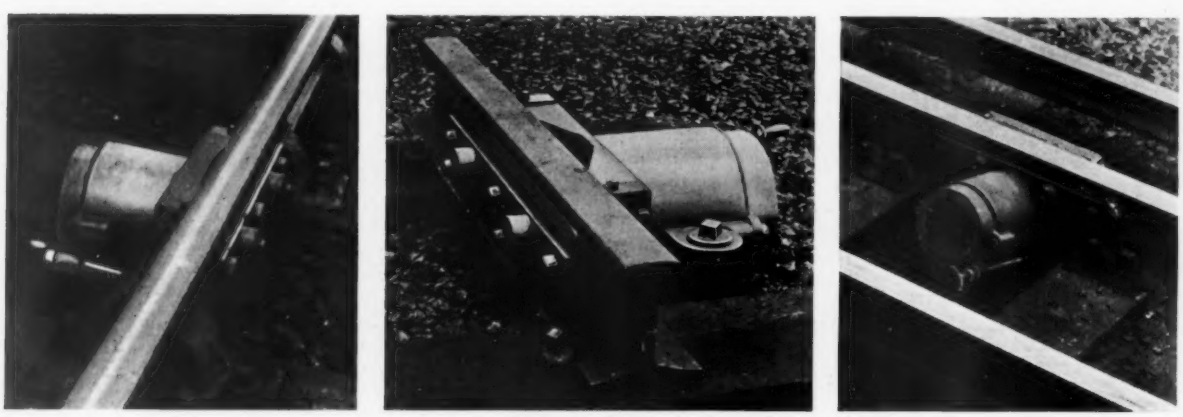
The apparatus consists essentially of the lubricant container and two pump assemblies on the outside of the rail, and the greasing plate and back plate assembly on the inside of the rail. The container itself is formed with cast iron lugs that fit into the fishing space of the rail, and the pump assemblies are bolted to each end of the container lugs. The apparatus is held together as a whole and secured to the rail by two cored main attachment bolts that pass through the greasing plate and steel back plate from the gauge side of the rail, through two $\frac{7}{8}$-in. holes in the web of the rail, and thence are screwed into tapped holes in the cast iron lugs of the container. The greasing plate is tightened up against the back plate and the rail face by two nuts on the attachment bolts and three additional short hexagon holding screws.

The lubricant in the container is held under pressure from a spring. By this pressure the lubricant is impelled through inlet ports to the barrels of the pumps attached to the container. The pumps have plungers projecting $\frac{1}{8}$-in. to $2\frac{3}{8}$-in. above the top table of the rail,, so positioned that the overhanging tread of each passing wheel presses them down. By this action the grease is forced through outlet ports and, by way of the cored bolts, to a distributing channel in the greasing plate and thence through 14 vertical grooves to the side of the rail head. The wheel flanges, making a light contact with the bevelled greasing plate, convey and apply the lubricant to the curved rail ahead.

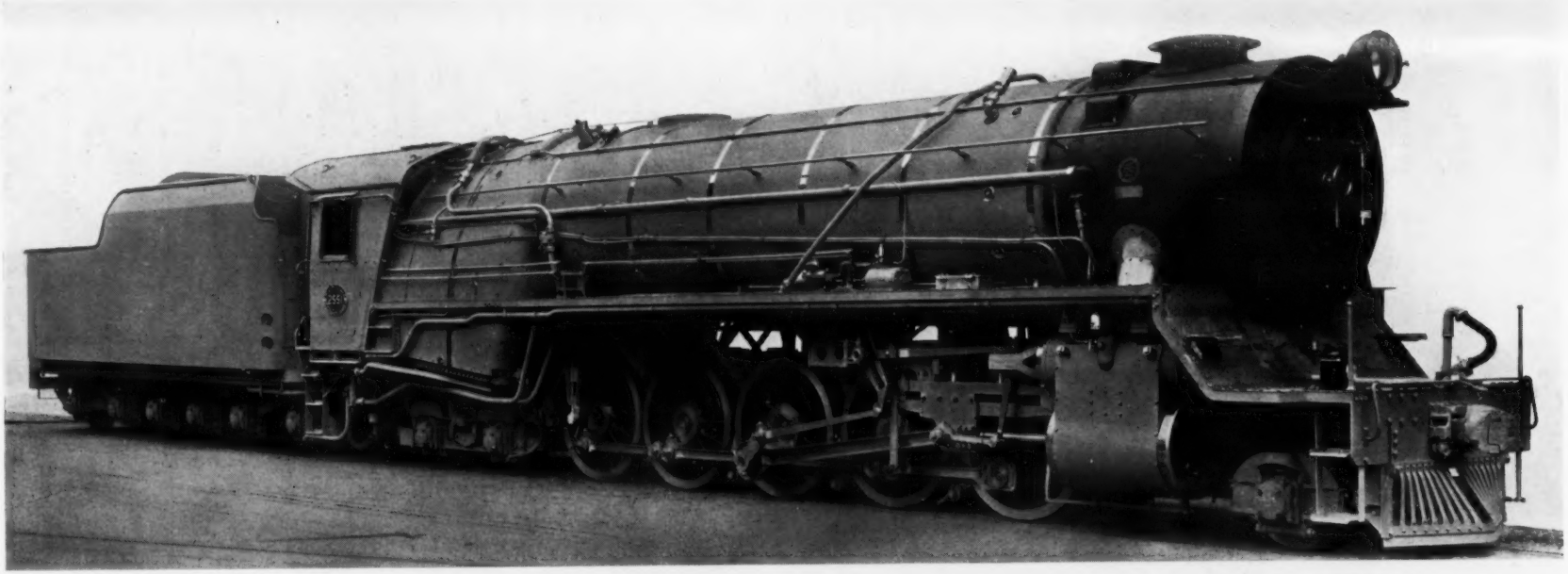


P. & M. positive feed rail lubricator

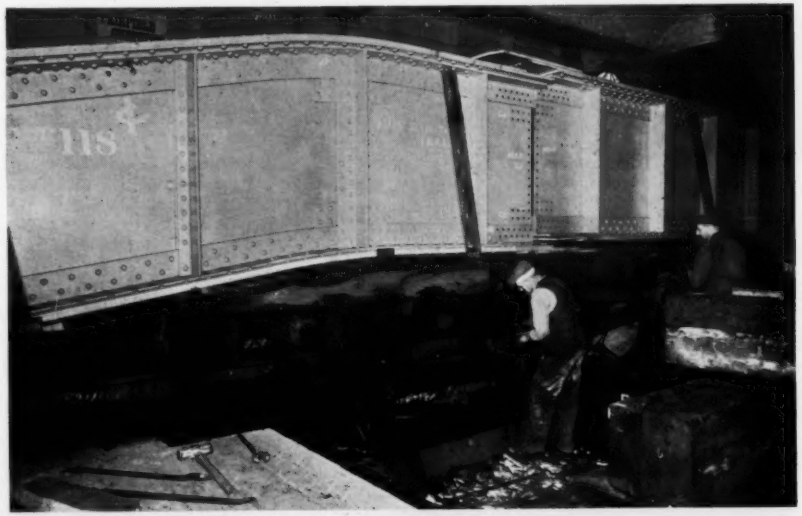
It will be seen therefore that the action of this lubricator is positive, the plungers being so arranged that they must be operated by the tread of every passing wheel. The height of the pumps and of the greasing plate is readily adjustable in accordance with the wear of the rail. A further simple adjustment regulates the amount of lubricant to be emitted. The consumption of grease varies, of course, with the traffic, but is surprisingly small. The container holds graphite grease, in a quantity that is generally sufficient for two to four weeks' lubrication on an average worked track, and longer in proportion as the traffic is lighter. Taxaco 904 grease, with a specially prepared graphite content efficient over a temperature range of 30° F. to 110° F., is used.



Left, lubricator in normal position, and, right, as fitted on the inside of the running rail where there is an electric conductor rail. The centre picture shows the greasing plate on the flange side with the container and pump assembly on the outside of the rail



New 2-10-4 type locomotive with 2-8-2 tender, built by the North British Locomotive Co. Ltd., Glasgow, for the South African Railways



Enlarging the tunnel at Aldgate East. Left: Rotating roof girder on turntable. Right: Roof girder raised into position. (See page 940)

Seymour Biscoe Tritton

IT is with great regret that we have to record the death on November 21 of Sir Seymour Biscoe Tritton, whose retirement from the position of active Senior Partner in the firm of Messrs. Rendel, Palmer & Tritton, Consulting Engineers, we recorded as recently as April 16 last. It is, perhaps, in India that his career has left its deepest mark, for Sir Seymour's connection with that country extended over 40 years, and left it with a high standard of railway equipment which is acknowledged as largely the result of the competence of the designing and inspection staff of his firm, for which he was responsible. Not only was his career one of remarkable ability and achievement, but its scope was unusually wide in view of his experience in both locomotive and marine engineering. His activities reached their zenith during the war, when his work on behalf of the War Office and the Ministry of Munitions involved responsibility for the design or modification and inspection of all new railway work on all fronts. This included track, locomotives—both steam and petrol—and rolling stock for four gauges, with variations in design to suit conditions in France, Belgium, Africa, Salonica, Egypt, and Mesopotamia. The work also embraced workshops and equipment, special cranes for bridge repairs, ropeways for forward areas, and various other devices for transport. A strong supporter of standardisation, Sir Seymour viewed the subject from the broadminded and progressive standpoint that it served its purpose only when frequently revised and brought up to date by the pooling of experience of both users and designers of equipment.

Photo] [Vandyk

The late Sir Seymour B. Tritton, K.B.E.

Partner in the firm of Messrs. Rendel, Palmer & Tritton, 1913–37

Sir Seymour Tritton was born in 1860, and was educated at Haileybury and University College, London. His technical training he received at the works of R. & W. Hawthorn, later Hawthorn, Leslie & Co. Ltd., in Newcastle-on-Tyne, then one of the best-known locomotive as well as marine engine builders; he was trained in both branches. In 1885 Sir Seymour proceeded to India as Assistant Locomotive & Carriage Superintendent of the Bengal & North Western Railway, but subsequently was appointed Assistant Superintendent and Works Manager on the Eastern Bengal State Railway at Kanchrapara. After rebuilding the first workshops there under Mr. A. W. Rendel, he remained on the E.B.S.R. for some years, eventually being placed in charge of the Locomotive, Carriage & Wagon Department of the Northern Bengal metre gauge section, which had recently been taken over by Government. Later he was sent home on sick leave and was then offered the post of Chief of the Staff to Sir Alexander Rendel, K.C.I.E.; he subsequently became a partner with him and Sir Frederick Palmer, the name of the firm from 1913 being Rendel, Palmer & Tritton.

During the war he and his partners were appointed Consulting Engineers for the War Office and Ministry of Munitions, and all matters concerning the design and inspection of new railway work, on all fronts, and details of the military light railways—of which some 3,000 miles were in operation at the Armistice—were worked out at its offices in Dartmouth Street. As many as 8,990 miles of track, 3,400 locomotives (many of them built and inspected in America) and nearly 72,800 wagons were designed or modified and inspected prior to being sent out to the various fronts. For his services in this connection Sir Seymour was created a K.B.E. in 1918. In 1924, at the request of the Government of India, he visited that country in connection with the design and introduction of the standard locomotives, taking with him preliminary designs prepared in England to meet the Indian Standard Committee's requirements. He also visited and reported on various Indian railways, and the ports of Chittagong, Karachi, and Madras, for which his firm acts as consultants; he received the thanks of the Secretary of State for the services he rendered on this tour.

Sir Seymour sat on several committees of the British Standards Institution, the specifications of which have now been universally adopted. He was always specially interested in inspection and was responsible for the large staff of inspectors employed by his firm, here and on the Continent, and was also an authority on the design of light-draught river steamers, on which subject he contributed papers. He was a Member of the Institutions of Civil and Mechanical Engineers, and of Naval Architects, and a past-President of the Institution of Locomotive Engineers.

The funeral service was held at St. Stephen's Church, Rochester Row, Westminster, on November 24 (see page 944), and was followed by a private burial service at Alfriston, Sussex. We comment editorially on Sir Seymour Tritton's career on page 906.

TRAIN FERRY VENTILATION.—Ventilation of the train decks of the Southern Railway Dover—Ostend train ferry steamers has been improved by the installation of Torpedo type ventilators in the forward part of the vessels, mushroom ventilators in the boat decks at rear, and replacement of wooden hatches with gratings.

RAILWAY NEWS SECTION

PERSONAL

Mr. R. H. Tolerton has been appointed a Principal Assistant Secretary to the Ministry of Transport; Messrs. S. A. Bailey, H. W. W. Fisher, and G. F. Stedman have been appointed Assistant Secretaries; and Mr. F. C. Bunn to be officer in charge of the Post and Transport (Defence Plans) Section.

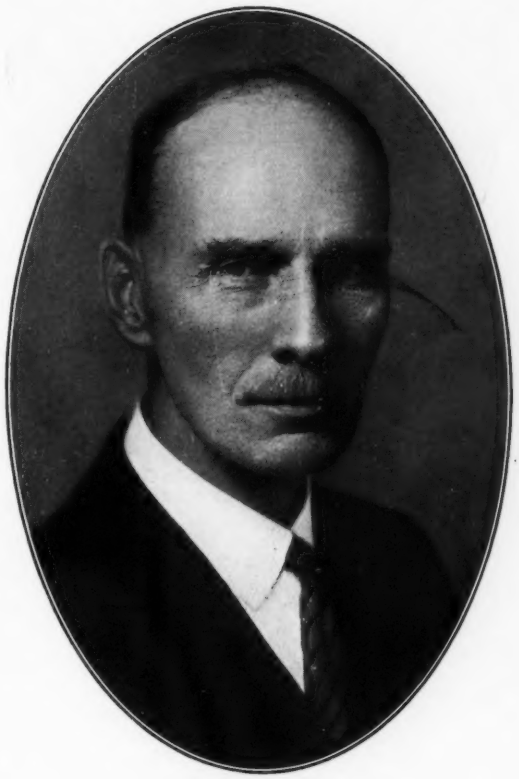
From *The London Gazette* of November 19. Nomination of Sheriffs, 1937. Worcestershire: Robert Holland-Martin, of Overbury Court, Tewkesbury, Esq., C.B.

We note with regret the death at Scawby, Lincolnshire, on November 17, at the age of 87, of Mr. R. N. Sutton-Nelthorpe. He had been a Director of the former Great Central Railway Company, 1902-22.

Mr. Alexander Wannan Donaldson, who has retired from the position of Assistant Engineer, L.M.S.R., joined the service of the L.N.W.R. in November, 1906, as Assistant to the Chief Engineer in connection with the tube portion of the electrified lines between Euston and Watford. He supervised the construction of the widening between Chalk Farm and Kensal Green, the power station at Stonebridge Park, and the various substations on the electrified lines. In 1913, Mr. Donaldson took over the Parliamentary work in addition to his other duties. In 1923, a Works Section was formed as part of the Engineer's Department under the immediate supervision of Mr. Donaldson, and numerous important works have been carried out by this section. His appointment as Assistant Engineer, L.M.S.R., dated from January 25, 1929. Mr. Donaldson, prior to his engagement with the L.N.W.R., had had considerable experience in tube work, being Resident Engineer on the portion of the Baker Street & Waterloo Railway between Oxford Circus and Baker Street, and on the Charing Cross, Euston & Hampstead Railway. Mr. Donaldson is a Member of the Institution of Civil Engineers and in August, 1932, was promoted Major, Engineer and Railway Staff Corps.

Mr. R. T. Garrett has been appointed a London Director of the Mount Lyell Mining & Railway Co. Ltd., Australia.

Mr. H. W. Chinn, Assistant Solicitor (Conveyancing), Southern Railway, retired on September 30. Mr. Chinn was educated at Rugby, and articled in Lichfield and London. After his admission as a Solicitor in 1896, he was for a year assistant in a large general practice at Reigate, and then entered the Solicitor's Office of the Great Western Railway at Paddington. In 1909 he became a Commissioner for Oaths. Mr. Chinn remained for 16 years with the G.W.R., under the late Mr. Robert Rogers Nelson and Mr. L. B. Page. He joined the Solicitor's Office of the former London & South Western Railway in 1913, and on grouping in 1923 became the senior Assistant Solicitor of the Southern Railway. Mr. Chinn was concerned principally with the acquisition of land for new railways, including the Totton, Hythe & Fawley Railway; the new Ramsgate-Broadstairs line; and the Wimbledon & Sutton line. He also had much to do with the development of Southampton Docks, and has handled many matters connected with the company's landed estate. Mr. Chinn will continue in practice, in association with a Westminster firm.



Mr. H. W. Chinn

Assistant Solicitor (Conveyancing), Southern Railway, 1923–37

PRESENTATION TO MR. E. D. GRASETT

Mr. E. D. Grasett, who recently retired from the position of Divisional Superintendent of Operation, Derby (see THE RAILWAY GAZETTE of July 6), and whose presentation from his personal staff was noticed in our issue of November 12, has also been the recipient of a silver tea set and a salmon rod from the members of the L.M.S.R. Goods and Traffic Operating Conferences. The presentation was made by Mr. C. R. Byrom, Chief Operating Manager, L.M.S.R.

On page 920 of this issue we publish a short article by Major-General Sir Henry Francis Edward Freeland, K.C.I.E., C.B., D.S.O., M.V.O., late R.E., upon the "Indian Railways and Their Competitors." Sir Henry was commissioned in the Royal Engineers in February, 1891, and went to India in March, 1893. After seeing service with the Chitral Relief Force in 1895, he was first appointed to the Indian railways in 1898, being posted to the Oudh & Rohilkhund system. He served with the China Field Force (1899-1902) and subsequently on return to India was employed on the North Western Railway. In 1911 he was selected as Traffic Manager of the Delhi Durbar Railways. In September, 1914, General Freeland proceeded to France and Belgium with the British Expeditionary Force, and in the following year was promoted Brevet Lieutenant-Colonel, and was decorated as an Officer of the Legion of Honour; in that year also he was appointed Deputy Director of Railway Transport, with the rank of Temporary Colonel. In 1916 he became Director of Transportation, and was awarded the D.S.O. He was promoted to be Deputy Director-General of Transportation, Forward Areas, and Brigadier-General in 1917, when he also received the honour of C.B. In November of that year Sir Henry was selected as head of the Military Mission to Mesopotamia, on which he served until March, 1918, when he was appointed Military Member of the Indian Railway Board and Director-General of Transportation on the Staff of the Commander-in-Chief, with the rank of Major-General; this post he held until June, 1919. At the conclusion of the Afghan war, he was honoured with the K.C.I.E., and, on

retiring from the army, became Agent of the Bombay, Baroda & Central India Railway in January, 1920. From this position he retired from India in April, 1925, and became a Director of the Barsi Light Railway in 1928, of the B.B. & C.I.R. in 1929, and of the Madras & Southern Mahratta Railway in 1930.

Mr. Thomas Powell, whose death on November 9 was recorded in THE RAILWAY GAZETTE of November 12, retired in 1928 from the position of Secretary and Manager of the Pullman Car Co. Ltd. after serving nearly 35 years with that company and its predecessors. Mr. Powell, who was born in London in 1859, had had a varied career in the commercial field until his appointment in 1894 as Chief Accountant to the Pullman Company, which handled the few Pullman cars then running on British railways under the control of the Pullman Company of America. In 1904 he was appointed Secretary of the company, and subsequently General Manager in England. His election as one of the two English directors of the company followed later. When, on the initiative of Mr. Davison Dalziel (eventually Lord Dalziel of Wooler), the Pullman interests were taken over by a new company in 1904, Mr. Powell was appointed Secretary and Manager, holding that position until his retirement in 1928. In war time, Mr. Powell's responsibilities included making arrangements for transport of officers going on and returning from leave between London and Dover.

The late Mr. Thomas Powell
Secretary and Manager, Pullman Car Co. Ltd., 1904–28

During his tenure of office the stock of Pullman cars in this country expanded from the few vehicles originally running on the L.B. & S.C.R. to a total of 234, and the catering facilities provided were elaborated from light refreshments to the service of full meals of a high culinary standard. Mr. Powell, in fact, interested himself particularly in this aspect of the company's work, and was for a time Chairman, and later Vice-President, of the Universal Cookery and Food Association. Mr. Powell was a Don of the Order of the Cordon Rouge.

Mr. J. W. Melville, who, as announced in our issue of November 12, has been appointed Senior Assistant (Permanent Way) St. Pancras, L.M.S.R., entered the Chief Engineer's office on the old Glasgow & South Western Railway on February 21, 1898, as as apprentice under his father, the late Mr. William Melville, then Chief Engineer. At this time there was great activity in building new lines and increasing the capacity of existing lines, and all the work was carried out by the staff of the Engineer. He left the service on August 26, 1899, to enter the works of Arrols' Bridge and Roof Co. Ltd., Germiston Works, Glasgow, and served there until September 9, 1901. While with this firm Mr. Melville was engaged on several large works, notably the Connel Ferry bridge and the Creagan, Larkhall, and Stonehouse viaducts on the old Caledonian Railway, and on the extension of St. Enoch station roof for the Glasgow & South Western Railway; also the Glasgow Exhibition (1901) buildings and a considerable amount of overseas work. In September, 1901, Mr. Melville rejoined the G. & S.W.R., and until his appointment as Permanent Way Assistant in January, 1907, was Assistant Resident on the Riccarton Loop Line, and the Maidens & Dunnure Light Railway. While Permanent Way Assistant, Mr. Melville was also concerned with dock and harbour work. In October, 1924, he was appointed Chief Assistant to Mr. A. Bishop, District Engineer in charge of the South Western District of the Northern Division, L.M.S.R. On January 1, 1927, Mr. Melville was appointed District Engineer, St. Enoch, Glasgow, and in 1932 became Permanent Way Assistant, Engineer's Department, Euston, from which position he is now transferred to his new appointment at St. Pancras.

Mr. E. S. Cox, who, as recorded in our issue of November 12, has been appointed Personal and Technical Assistant, C.M.E. Department, Euston, L.M.S.R., received his training in the Horwich Locomotive Works of the former Lancashire & Yorkshire Railway, under Mr. George Hughes. In 1921 he entered the Locomotive Drawing Office at Horwich, and was transferred in 1925 to the Locomotive Drawing Office, Derby, L.M.S.R.,

Mr. J. W. Melville
Appointed Senior Assistant (Permanent Way), St. Pancras, L.M.S.R.

Mr. E. S. Cox
Appointed Personal and Technical Assistant, C.M.E. Department, Euston, L.M.S.R.

where from 1927 onwards he was in charge of dynamometer car testing. Mr. Cox was transferred to Euston on the staff of the Chief Mechanical Engineer in 1931, and in 1934 was appointed Assistant Works Superintendent, Locomotive Works, Derby. He now vacates the position of Development Assistant, Derby, to which he was appointed last year.

Mr. G. T. Rice has been elected to the bondholders' committees of the Algoma Central & Hudson Bay Railway Company, and of Algoma Central Terminals, in succession to the late Mr. Andrew Williamson, whose death was recorded in our issue of November 5.

The late Mr. M. C. Tait, Chief Solicitor to the former London & North Western Railway Company from 1915 to 1921, left personal estate valued at £9,672 (£5,673 net). Mr. Tait died on September 24 this year, as was recorded, with a biographical notice, in THE RAILWAY GAZETTE of October 1.

Mr. Walter Enves, M.B.E., Stationmaster at Victoria, Southern Railway, has been honoured by King Leopold of Belgium with the decoration of Chevalier of the Order of Leopold II. The insignia of the decoration were handed to Mr. Enves by the Belgian Ambassador in London on Wednesday.

Mr. E. A. Wicks, Stationmaster at Colchester, L.N.E.R., has received the Palmes d'Or of the Order of the Crown of Belgium, which was conferred upon him by King Leopold of Belgium following his visit to Colchester on November 18.

INDIAN RAILWAY STAFF CHANGES

Mr. R. Lean, Chief Mechanical Engineer, M. & S.M.R., has been granted six months' leave as from October 20, and Mr. T. Pinder, Deputy Mechanical Engineer, has been appointed to act in his place as Chief Mechanical Engineer.

Mr. N. W. Synnott has been appointed to officiate as Deputy Chief Commercial Manager, E.I.R., as from September 27.

Mr. W. H. H. Young, Chief Commercial Manager, has been appointed to officiate as Chief Operating Superintendent, E.I.R., as from September 27. Mr. J. C. Rose has been appointed to succeed him as Chief Commercial Manager.

G.I.P.R. Officiating Appointments as from September 13–14

Mr. E. M. Cory to be Chief Engineer.

Mr. F. G. Langdon to be Deputy Chief Engineer (Construction).

Mr. C. G. Graham to be Deputy Chief Engineer (Maintenance).

Mr. A. G. T. Glaisby to be Deputy Agent (Works).

Mr. S. M. Basrur to be Deputy Agent (Staff).

Mr. S. Taylor, officiating Deputy Chief Mechanical Engineer, E.B.R., has been granted 3½ months' leave preparatory to retirement, as from November 4.

Mr. L. F. W. Nolan, Deputy Chief Engineer, A.B.R., on return from leave, resumed his duties on October 29.

We regret to record the death, on November 23, of Mr. Douglas Vickers, formerly President of Vickers Limited and a Director of the L.M.S.R. since its formation. Mr. Vickers had previously been on the board of the former Midland Railway. He took a keen interest in the International Railway Congress Association, and regularly attended its meetings.

We regret to record the death on November 16 of Mr. James Henry Foster, a Director of Quicktho (1928) Limited, and of Quicktho (France), makers of window regulating devices.

The late Sir John Lulham Pound, who died on September 7 (see THE RAILWAY GAZETTE of September 10), left estate valued at £15,545 (£11,955 net).

The late Mr. E. P. Leigh-Bennett, whose death on July 2 was recorded in our issue of July 9, left estate valued at £8,227 (£8,125 net).

We regret to record the death on September 16, at the age of 92, of Mr. William Powell, who retired in 1921 from the position of Signal Engineer of the Taff Vale Railway, which he had held from about the middle 'eighties; during that time he had with him, either on his staff or as pupils, many who have since reached important positions in the signalling world, both at home and overseas. Mr. Powell entered the service of the well known firm of McKenzie & Holland at Worcester in the 'sixties and was engaged on a number of early and important signal installations, notably on busy sections of line round London on the Great Eastern and Great Northern Railways. He was a member of the Association of Railway Companies' Signal Engineers and Superintendents, being its President at one period, and became a Member of the Institution of Railway Signal Engineers in its first year of existence. Mr. Powell was present at the summer meeting of the institution at Cardiff in 1934, during the Presidency of Mr. R. S. Griffiths. Mr. Powell's elder son, Mr. W. H. Powell, was formerly also in the service of McKenzie & Holland, and is now a Director and General Manager of the Westinghouse Brake & Signal Co. Ltd.

It is with regret that we have to announce the death on October 12, at the age of 90, of another signalling pioneer, Mr. William Henry Deakin. As a youth he was in the service of Stevens and Sons, long a well-known signalling firm, by whom his father and other relatives were employed, and in 1874 joined McKenzie & Holland, remaining with that firm until its business was absorbed into the Westinghouse Brake & Saxby Signal Co. Ltd., when he was transferred to Saxby & Farmer (India) Limited, retiring in 1922. He visited India for McKenzie & Holland in 1883 and later spent many years there, being responsible for the design of a number of simple forms of signal equipment especially suited to conditions in that country. In 1891 he was sent to Australia for a time and took charge of the firm's works and business there during the absence of the late Mr. Sidney P. Wood, Australasian representative for many years. Mr. Deakin was much interested in engineering history and contributed papers on the development of signalling to the Institution of Railway Signal Engineers, which he joined in 1928 and at whose meetings he was until the last year or so a familiar figure. Mr. Deakin was also a clever artist, frequently contributing to Indian periodicals, over the signature "Jo Hookm," humorous sketches with appropriate text, a number of which were collected and published with the title "The Koochpurwanaypore Railway."

Forthcoming Events

Nov. 26 (*Fri.*).—Permanent Way Institution (Hull), at Lecture Hall, Paragon Station, 7 p.m. "Permanent Way for High Speed," by Mr. W. A. Willox.

Nov. 29 (*Mon.*).—Engineers' German Circle, at Inst. of Mechanical Engineers, Storey's Gate, London, S.W.1, 6 p.m. "Stand und Entwicklung des Deutschen Kraftwerksbaues (Present Position and Development of the German Power Station Construction)," by Dr.-Ing. Schult.

L.N.E.R. Musical Society, at Liverpool Street Hotel, London, 8 p.m. Concert.

Nov. 30 (*Tues.*).—L.N.E.R. (York) Lecture and Debating Society, at Railway Inst., Queen Street, 6.45 p.m. "German Railways," by Mr. E. Arkle.

Dec. 1 (*Wed.*).—Royal Society of Arts, John Street, London, W.C.2, 8.15 p.m. "The Manchester Ship Canal," by Vice-Admiral Sir Percy Douglas, K.C.B., C.M.G.

Dec. 2 (*Thurs.*).—Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. "The Evolution of Railways," by Mr. Charles E. Lee.

Dec. 3 (*Fri.*).—Institute of Transport (Nottingham Graduate), at Guildhall, 7 p.m. "L.N.E.R. Canals," by Mr. J. Twells.

Institution of Civil Engineers (Assoc. of Glasgow Students), at Inst. of Engineers and Shipbuilders, Glasgow, 7.30 p.m. "Railway Work in North China," by Mr. W. Leitch.

Omnibus Society, at Inst. of Marine Engineers, The Minories, London, E.C.3, 7 p.m. "London Area Developments," by Mr. Charles F. Klapper.

Dec. 4 (*Sat.*).—Stephenson Locomotive Society (Midlands-Northern), at 4, Bury Old Road, Manchester, 6.30 p.m. "A Railway Miscellany," by Mr. F. Carrier.

Dec. 6 (*Mon.*).—G.W.R. (Birmingham) Lecture and Debating Society, at Great Western Hotel, Snow Hill Station, 6.30 p.m. "The Development of the Empire's Airways," by Mr. A. Valder.

Dec. 7 (*Tues.*).—Great Eastern Mechanics' Institution, Stratford, 8 p.m. "Modern Theory and Practice in Lubrication," by Col. S. J. M. Auld, M.C.

Supplementary Reserve Transportation Units, R.E. Annual Training, 1937

All the Supplementary Reserve Transportation Units, R.E., underwent their annual training at Longmoor Camp, Hants, between May and September. The training followed on the lines of previous years, each company spending approximately one week of its fortnight in camp on military training, and one week on a technical scheme. In view of the difficulty experienced last year in training two operating companies simultaneously, owing to their increase in numbers, the experiment was tried of combining a construction and one operating company and to a limited degree combining the technical training of the two. The experiment can be considered to have proved successful.

The two operating companies each took over the operation of the Longmoor Military Railway (formerly called the Woolmer Instructional Military Railway) and operated continuously for 36 hours. During the latter part of this period their working was based on requirements of the construction companies who had by then started their technical scheme, and in addition some very realistic air raid effects were introduced in order to emphasise the "war picture."

A party of officers of the docks company carried out a two-day exercise at Poole. Although the scheme was a theoretical one, every effort was made to get down to practical details and in a large measure this was achieved; for the N.C.O.s and men a practical exercise was arranged and carried out at Longmoor.

The Workshops Company took over the running of the Longmoor Military Railway workshops and in addition was given the opportunity of drawing and examining their mobilisation equipment.

The three construction companies continued their previous year's work on the Hollywater branch and good progress was made; as mentioned above, two of the companies worked in with the operating companies exercise and although arrangements did not always go according to plan the new experience gained by both as a result of the necessity for co-operation was of considerable value.

The Stores Company was given the task of forming an advanced transportation stores depot; this was somewhat of an innovation compared with previous years' training, and proved very instructive and interesting; both officers and men appreciated the fact that they had been given something practical to do which approximated very closely to their normal role in war. One of the construction companies was also able to benefit from the scheme as it had to draw all its stores from this advanced depot and the exercise thus gave both companies an opportunity of appreciating and overcoming the various difficulties which are likely to be met with on service. It is being considered whether some such idea could not be applied also to the docks company; a good deal of imagination and ingenuity will be required to make it work but it seems to present definite possibilities.

Inspections and Visitors

Inspections were made during the summer by the Quartermaster General to the Forces; the Director of Movements and Quartering; the Chief Engineer, Aldershot Command; and the Assistant Director of Transportation.

Among the railway officers who visited Longmoor during the annual camp were:—

Colonel Sir Herbert A. Walker, K.C.B., T.D. (General Manager, Southern Railway), Hon. Colonel Transportation Units, R.E. (S.R.); Colonel R. Carpmael, O.B.E. (Chief Engineer, G.W.R.); Colonel H. A. Short, M.C. (late O.C. H.Q. Ry. Stores Group); Lieut.-Colonel Gilbert S. Szlumper, C.B.E., T.D. (Assistant General Manager, Southern Railway); Lieut.-Colonel R. J. M. Inglis, C.B.E. (Engineer, Southern Area, L.N.E.R.); Major L. F. S. Dawes, M.B.E. (Secretary, Southern Railway); Major C. M. Jenkin-Jones (Divisional General Manager L.N.E.R.); Major A. S. Quartermaine, M.C. (Assistant Chief Engineer, G.W.R.); Mr. C. M. Stedman (Locomotive Running Superintendent, North Eastern Area, L.N.E.R.); Mr. O. H. Corble (Assistant to Chief General Manager, L.N.E.R.); Mr. F. E. Harrison (Engineer, North Eastern Area, L.N.E.R.); and Mr. I. R. Fraser (L.M.S.).

The weather this year excelled itself, and the only unlucky units were the workshops and signal companies who struck the one wet afternoon for their regimental sports.

Units attending camp were as follow:

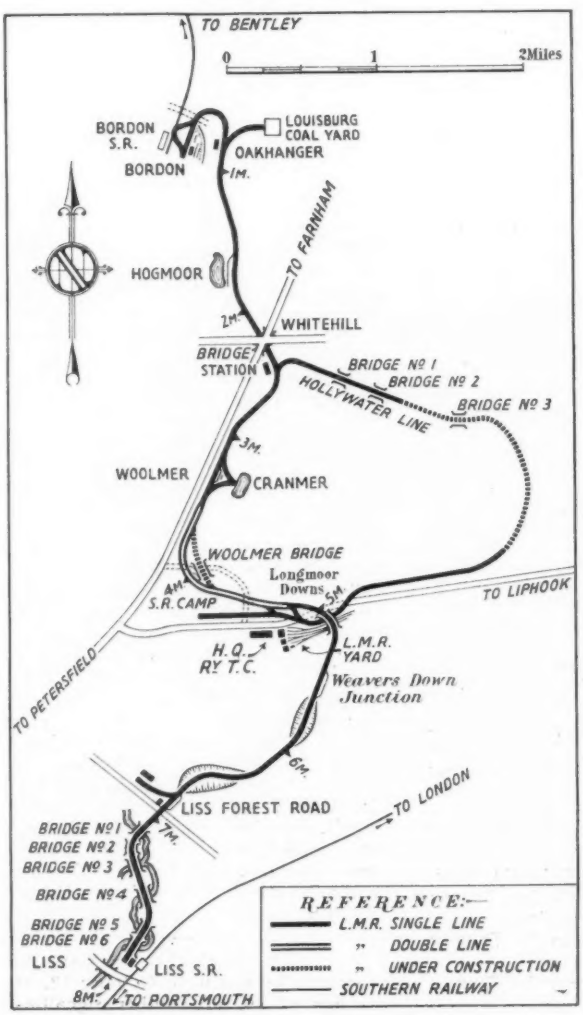
May 20 to June 3—
H.Q. No. 1 Docks Group, R.E. (S.R.). Commanding Officer, Lieut.-Colonel J. R. Sadler, R.E. (S.R.). 157th (L.N.E.R.) Ry. Docks Coy. R.E. (S.R.). Major L. E. Marr, R.E. (S.R.).

June 4 to June 18—
150th (L.N.E.R.) Ry. Construction Company, R.E. (S.R.). Commanding Officer, Major J. Scott, M.C., R.E. (S.R.).
H.Q. Ry. Operating Group, R.E. (S.R.). Commanding Officer, Brevet-Colonel W. E. Blakey, M.M.
153rd (L.N.E.R.) Ry. Operating Company, R.E. (S.R.). Commanding Officer, Major H. F. Sanderson R.E. (S.R.).

June 24 to July 8—
151st (G.W.R.) Ry. Construction Company, R.E. (S.R.). Commanding Officer, Major R. H. Edwards, R.E. (S.R.).
154th (G.W.R.) Ry. Operating Company, R.E. (S.R.). Commanding Officer, Major K. L. Yorath, R.E. (S.R.).

August 4 to August 18—
155th (L.M.S.R.) Ry. Workshop Company, R.E. (S.R.). Commanding Officer, Lieut.-Colonel J. V. Denning, M.C., R.E. (S.R.).
No. 2 (L.M.S.R.) L. of C. Signals (S.R.). Commanding Officer, Lieut.-Colonel R. Tandy, R.C.S. (S.R.).

August 19 to September 2—
152nd (G.W.R.) Ry. Construction Company, R.E. (S.R.). Commanding Officer, Major E. C. Cookson, R.E. (S.R.).
H.Q. Ry. Stores Group, R.E. (S.R.). Commanding Officer, Lieut.-Colonel A. B. Chester, R.E. (S.R.).
156th (S) Ry. Stores Company, R.E. (S.R.). Commanding Officer, Major L. J. M. Knotts, R.E. (S.R.).



Map of the Longmoor Military Railway

151*st* (*G.W.R.*) *Railway Construction Company at Cranmer*

150*th* (*L.N.E.R.*) *Railway Construction Company at Hollywater*

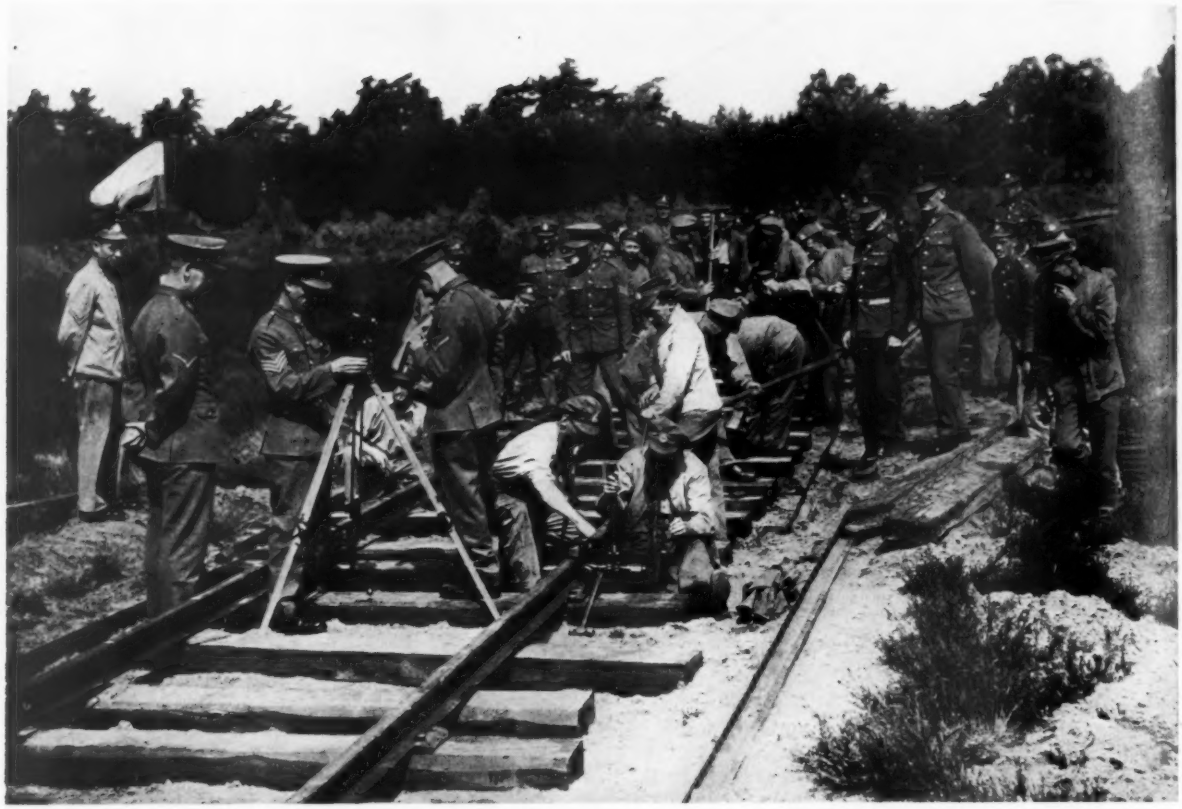
156th (S.R.) Railway Stores Company—Advanced transportation store depot at Woolmer

152nd (G.W.R.) Railway Construction Company at Hollywater

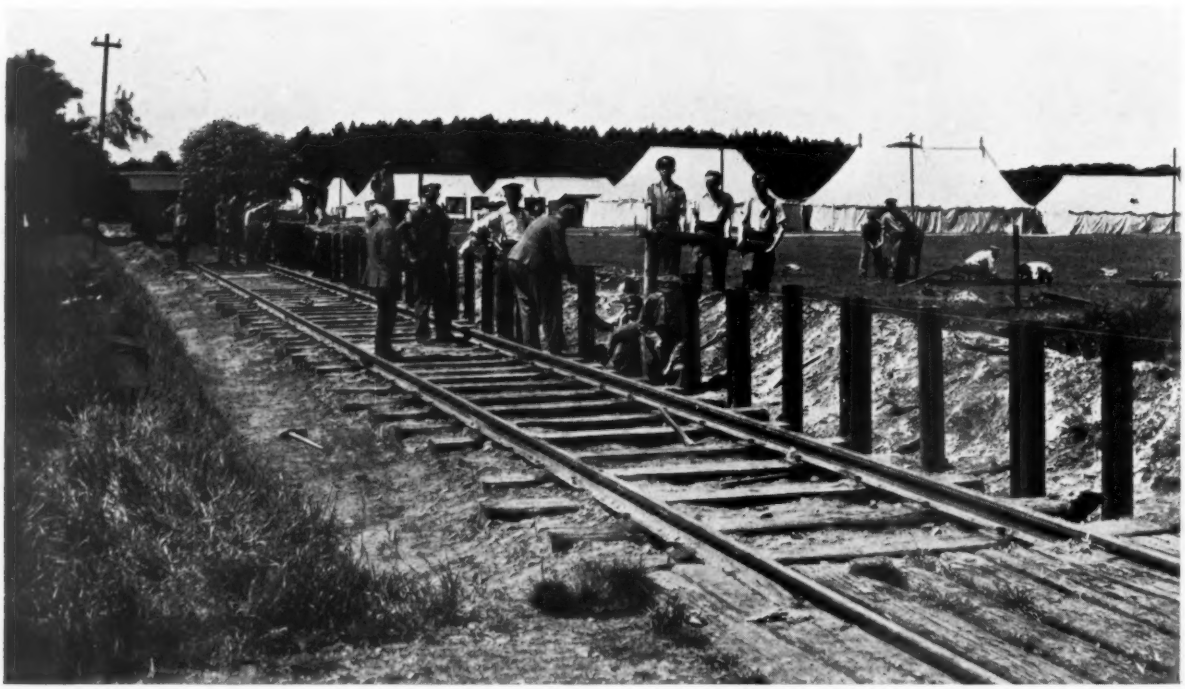
152nd (G.W.R.) Railway Construction Company at Cranmer

152nd (G.W.R.) Railway Construction Company—Pile driving on Cranmer Pond with diesel pile driver

152nd (G.W.R.) Railway Construction Company (left) working on diesel pile driver, and (right) at Hollywater



150*th* (*L.N.E.R.*) *Railway Construction Company at Hollywater*



157*th* (*L.N.E.R.*) *Railway Docks Company, R.E., constructing new platform at Applepie Siding*

SUPPLEMENTARY RESERVE TRANSPORTATION UNITS, R.E., ANNUAL TRAINING

(*See page* 934)

Railway Work in North China

A lecture on "Railway Work in North China" was given by Mr. W. O. Leitch, late Chief Engineer and General Manager, Peiping Liaoning Railway, at the meeting of the Great Western Railway (London) Lecture and Debating Society on November 11, presided over by Mr. R. Carpmael, Chief Engineer, G.W.R. The speaker had a large number of lantern slides of great interest. He gave a brief survey of transport in China up to the time of the first line a few miles long from Shanghai to Woosung in 1876, and from that date up to the present day. During this period 5,000 miles of line were built under British, Russian, French, Belgian, and German contracts; a body of Chinese railwaymen had to be trained, and a Government department formed. When China became more stable under the present Government the necessary conditions for a new era in railway work were present. Very good work had been done by Chinese railwaymen, and if the present schemes for new lines could be carried through, China's railway mileage would be almost doubled. Loan service committees would look after the repayment of instalments, but Chinese railwaymen would control construction and operation, assuming there was peace in China.

Mr. Leitch showed some of the bigger bridges, such as those at Lanchow and Chien Tang near Hangchow (which was intended to be opened in October this year) and described the peculiar methods of construction and materials. The general method of constructing the bridge piers was to erect a row of tripods over each pier to handle air locks, &c. Excellent concrete was still widely hand mixed.

On occasions the rainfall mounted to 19 in. in the 24 hr., and the worst enemy of the engineer was flooding. In 1930 the water rose to unprecedented levels, piers and smaller bridges were washed away, and girders displaced. Embankments which had stood for 30 years were washed away. In many such cases traffic could be resumed by transhipment, the passengers philosophically walking from one side of the washout to the other. Again, the railway would be found in a widened river bed instead of being on raised land clear of the river. Special reference was made to the Liu River silt deposits. The extent of these was great enough almost to bury villages, to cover the railway for a mile or two, to convert an underbridge into a cutting, and to carry away hundreds of feet of track. Unusual repair problems faced the engineer during the civil wars, when considerable damage was done to the railways. Bridges had to be repaired after being blown up or damaged by prepared derailments.

On the Peiping-Mukden Railway the principal locomotives in use were of 4-6-2 type for passenger work and 2-8-2 for goods, of which 125 were fitted with superheaters. Much of the goods traffic was conveyed in 40-ton wagons. The railway had its main workshops at Tongshan, where everything except axles, tyres and springs could be made and which when busy employed 2,400 men. There, during recent years, 92 locomotives had been built or rebuilt, as well as over 500 coaches and 3,700 wagons.

As regards signalling, the electric staff was in use on single line and the lock and block system on double, but the relative costs of labour and material meant that so far it had not been worth while to replace mechanical by power operation. In contrast with the recommendation of the Wedgewood Report on Indian railways that for single line passing stations the central cabin with wire-worked points was cheaper, the two-cabin system had been found to be the better.

The Peiping-Mukden Railway had a remarkable operating record. The loan for £2,300,000 at 5 per cent. made in 1898 would be completely paid off in about 8 years, and the railway would be in the position of having no shareholders to whom interest had to be paid. The operating ratio for 30 years was 44 per cent., and from 1905 to 1915 the average was 30 per cent., and was now about 60 per cent.

Mr. Leitch also described from an engineer's view point the Marco Polo bridge, Fengtai (*circa* 1169) with eleven spans varying from 44 to 50 ft., and arches of masonry as good as any done today; also the Great Wall of China, which the railway crossed at several points.

Modern Battery Manufacture

By reason both of its reliability and the wisdom of those who make it, the electric battery does not inspire its users to take it to pieces. Batteries have a deceptive external similarity, so that even those who rely upon them daily for vital services may be unaware of the precise structural differences between the types recommended for various duties.

A convenient alternative to the educative process of taking a battery to pieces was offered by the Chloride Electrical Storage Co. Ltd. on November 19, when a party of some 200 press representatives was invited to the company's works at Clifton Junction, near Manchester, to inspect the processes by which batteries are built up. In manufacturing types ranging from the small domestic wireless accumulator up to the massive cells required for submarines, far more is involved than a difference of size and capacity, and the research staff of the Chloride Electrical Storage Co. Ltd. is constantly investigating new materials and types of plate formation suitable for exacting duties.

Railway users of Exide batteries are concerned principally with the Ironclad, Planté, and Chloride-Rosette types, all used for train lighting, and the first-named for propulsion and cooking as well. The positive plates of Ironclad cells are of armoured tubular construction, evolved to avoid the breaking up of the paste film on the plates in heavy service. The plate structure consists of slitted ebonite tubes threaded over the spines forming the grid of the plates, thus holding the lead oxide coating securely in position round the spines. Pasting is avoided altogether in cells using Chloride-Rosette positive plates—a flat pattern of special alloy for heavy service, with rosette-shaped inserts presenting a very large surface area to the electrolyte. The production of these rosettes, as well as the filling of Ironclad tubes with red lead, is carried out by machinery specially designed for the purpose by the Chloride Company and maintained in its own workshops. A demonstration was also given of the company's Keepalite emergency lighting system, in which a contactor gives instantaneous changeover from the mains to a battery should the mains supply fail.

The visitors on Friday were shown the extensive precautions taken at the works for the health of operatives. The floors of the shop where Ironclad tubes are filled are kept flooded with water to allay lead oxide dust; the men wear respirators; and the shaking machines which tamp the filling into place in the tubes work behind a glass screen. Men engaged in work classed as dangerous undergo periodical blood-tests in the clinic, with full-time doctor, attached to the works. Exhaust ducts and extractors are provided wherever practicable over benches where work emitting dust or fumes is dealt with.

The party travelled to and from Manchester by L.M.S.R. special train, consisting of seven first class coaches and two kitchen cars, from which meals were served throughout the train. On the return journey, the 188½ miles from Manchester (London Road) to Euston were timed to be covered in 195 min., which schedule was closely observed. A "Patriot" class locomotive, No. 5518, worked throughout in both directions, and carried a circular plaque on the smokebox inscribed "Press Visit to the Exide Works."

ROME-FLORENCE EXPRESS IN COLLISION.—On Saturday, November 20, during the afternoon, an Italian State Railways express running between Rome and Florence collided with a stationary goods train near Orvieto, 75 miles from Rome. The locomotive and several coaches were derailed and a number of persons received slight injuries. The accident is said to have been due to a signalling defect.

London Transport Railway Improvements

Considerable progress has been made with the programme of new works undertaken in 1935 by the London Pasenger Transport Board, and the following notes outline some of the interesting features which have just been made public.

Bakerloo Tube Extension

Some 1,500 men are now working on the extension of the Bakerloo tube line from Baker Street to Finchley Road and the associated reconstruction works on the Metropolitan Line. Operations began less than a year ago and the boring of the 2¼ miles of double tube tunnel has just been completed. The whole scheme, which will cost about £7,000,000, comprises the new tube tunnels; the construction of new tube stations at Acacia Road and Swiss Cottage and the modernising of Baker Street station; reconstruction or enlargement of 15 stations; the rearrangement and resignalling of 28 miles of track; the widening of 8 miles of line between Harrow and Rickmansworth; the electrification of 10½ miles of lines between Rickmansworth, Amersham, and Chesham; and the rebuilding of the Neasden depot.

The whole work is a noteworthy achievement in planning, for the hundreds of trains which travel over the Metropolitan Line tracks every day are at some places less than 3 yd. from deep excavations, yet tracks are being rearranged, bridges and fly-under junctions are being built, stations are being reconstructed, and the tubes have been driven, without disturbing normal services, excepting for some temporary speed restrictions in a few sections. So far the programme has been followed exactly to time.

Work at Finchley Road

The junction at Finchley Road station of the new tube with the Metropolitan tracks is a complex undertaking. The excavations in Finchley Road are necessary to build a new "up" tunnel for Metropolitan trains. When the "up" trains are transferred to this new tunnel, the beginning of which may be seen from the Finchley Road platform, the tubes will be driven through the old "up" tunnel, rising to the surface at the station. Work has just begun on cutting away part of the island platform at Finchley Road. When completed, this station will be the key interchange station of the new system. The fast tracks will be on the outside and the slow tracks on the inside, with two island platforms in between. All trains, Bakerloo and Metropolitan, will stop here, and a passenger arriving from the City by a Metropolitan train will thus be enabled to change into a Bakerloo train across the platform. There will be no subways and no need to use stairs or bridges.

The construction of the two fly-unders, one at Wembley Park and the other at the junction of the Stanmore branch, is well advanced, and actually the fly-under which will enable trains to leave the Neasden depot without fouling other tracks has passed its most difficult stages. Since March, the four tracks at this point have been carried on temporary supports and slewed to a temporary alignment to enable the walls and the roof of the fly-under to be erected. The roof has now been completed, the tracks are on permanent supports and it will be possible early in the new year to relay the tracks in their final alignment; the speed restrictions on fast trains will then be removed. The gantry that crosses the lines at this point is employed to remove the excavated material. Concrete is pumped to the site some four hundred yards away through a 6 in. pipe laid underneath the tracks.

North of Wembley Park station, where a new fly-under junction will carry trains to and from Stanmore, the speed of "up" fast trains is restricted, because one of the walls of the subway is being constructed very close to this track. This restriction also will be removed early in the new year. It is hoped to run the first Bakerloo train to Wembley Park and Stanmore about the middle of 1939.

Baker Street Station

The works at Baker Street station are extensive, and on October 14 the London Passenger Transport Board signed a contract for over £100,000 for the construction of the new tube junction and an escalator tunnel. The junction consists of connecting the southern ends of the new tubes from Finchley Road with the existing Bakerloo tubes at a point about 100 yards east of the present Bakerloo platforms. There will be two south-bound Bakerloo platforms instead of one, as at present. The reason is that Bakerloo trains will arrive at Baker Street both from the Stanmore line and the Queens Park line, and if there was only one platform and trains arrived about the same time on each line one train would have to remain in the tunnel until the platform was cleared. Passengers have an objection to waiting in the tunnel, and it was this which influenced the board in deciding to build the south-bound platform slightly to the north of the existing south-bound platform. Even if trains arrive on the two lines simultaneously they will be able to run straight alongside a platform, while the new arrangement will considerably accelerate the service. In the new escalator tunnel two escalators are to be installed, and they will lead to the Bakerloo trains from a spacious circulating area that will be built under the existing Metropolitan platforms. Another escalator tunnel will carry passengers from the circulating area to Baker Street. Travellers will thus be able to reach the street from tube level without having to use stairs.

Enlarging the Tunnel at Aldgate East

In connection with the reconstruction work now being undertaken by the London Passenger Transport Board at Aldgate East station, twenty-one heavy girders are being erected to carry the roof in one span. When the girders are all in place the existing tunnel will be enlarged from 30 ft. to 70 ft. in order to carry four lines instead of two. The erection of these 70-ft. girders is carried out early every Sunday morning during the four-hour traffic break. Each girder is run into the station in two parts mounted on roller-borne turntables on special trucks. On arrival in position, the girders are rotated until they are at right angles to the track. The two ends are then ready to be bolted together with a process which occupies about two hours. In another half-an-hour the girder has been raised into position and the line is once more clear for traffic. Two photographs showing the operation are reproduced on page 929.

All-Welded Railway Bridge

To replace an existing bridge carrying the Hammersmith & City Line over Ladbroke Grove, London Transport has placed a contract with Dorman Long & Co. Ltd. for an all-welded plate girder bridge which will be the first of this type and size in this country. It will have a skew span of approximately 60 ft. and will consist of three main plate girders, instead of the two girders of the existing bridge, with a deck consisting of 10 in. by 8 in. by 70 lb. rolled steel joists spaced at 1 ft. 8 in. centres with concrete filling between them and carrying ordinary ballasted track. The weight of the steelwork of the new bridge will be approximately 20 per cent. lighter than that of a similar bridge of riveted construction, and the cost will be nearly 7 per cent. less. The main girders will be brought to the site completely welded, and there the cross girders will be welded to them. When the new bridge is ready, the old one will be rolled on to trestles erected alongside, and the former, which will have been erected on similar trestles on the other side of the line, will then be rolled into position. The whole work will occupy about 31 weeks, but the actual moving will be done in twelve hours. An advantage of this type of bridge is the elimination of the noise of riveting at the site, an important factor in a thickly-populated area such as that in which the work will be carried out. Another advantage of the welded type of bridge is that the solid type of flange used in place of the laminated flange of the riveted bridge is less liable to corrosion. Further, the absence of angles and rivet heads simplifies painting and maintenance.

L.M.S.R. Chief Accountant's Office Annual Dinner

The Chief Accountant's Department of the L.M.S.R. held its sixth annual dinner and smoking concert at Euston on Friday, November 19, Mr. G. Morton, Chief Accountant, presiding. There was a record attendance of the staff, and the guests included the accountants of the other main-line railways, as well as a large number of the chief officers of the L.M.S.R.

In the course of his reply to the toast of the " L.M.S. Railway " proposed by the Chairman, Sir William Wood referred, in appropriate terms, to the retiral of Mr. Taylor owing to ill-health, and also offered his congratulations to Mr. Morton on his appointment. Sir William stressed the importance of co-operation between the various departments as the activities of each department were interconnected, and he further stated that in his view the future requirements of the management, in relation to financial problems, would place still greater demands upon the Accountant's Department.

Sir Ralph Cope, during his reply to the toast of " The Guests," referred to the great importance and value of the co-operation between the accountants of the various companies in dealing with matters affecting the railways as a whole.

The toast of " The Chairman " was aptly proposed by a member of the staff, and suitably responded to by Mr. Morton, and an excellent musical programme was provided during the evening.

Among those present, in addition to those already referred to, were Messrs. A. F. Bound, W. H. C. Clay, T. Clifton, R. G. Davidson (S.R.), C. E. Fairburn, J. W. Harris, H. V. Mosley, W. A. Stanier, G. Sutherland (L.N.E.R.), S. J. Symes, and W. K. Wallace.

Visit to the Witton Engineering Works

On Thursday, November 18, the General Electric Co. Ltd. invited a party of press representatives to inspect the more recent extensions to the company's engineering works at Witton. Amongst the latest additions shown to the visitors were the Steelclad mercury arc rectifier works, a high-power testing laboratory, battery works, a mechanised foundry, and moulded insulation works. Apart from the foregoing, important additions have been made in the last two years to the switchgear works; a complete new storey, with an area of 25,000 sq. ft. has been erected over part of the existing works, embodying an entirely separate shop devoted to the manufacture of standard starters and controllers; a new coil winding and insulating shop has been built over the existing winding bay, in the main engineering works and increased manufacturing space has also been required for the production of small motor-driven appliances.

During luncheon, which was served at the works, Dr. A. H. Railing, Director in charge of Engineering Works, extended a general welcome to the press, and in a comprehensive speech explained the underlying principles which determined the production and development of specified electrical equipment; as a matter of interest he mentioned that in 35 years the Witton works of the General Electric Company had increased in extent from 7 to 70 acres and now employed 10,000 people, as contrasted with a mere 200 in 1902; he regretted that, owing to the limited time at their disposal, it was not possible to conduct their guests over the main engineering works, where amongst other things, large turbo-alternators, rolling-mill motors, electric winding engines and transformers are assembled.

The entire tour and concomitant arrangements were carried out with efficiency and precision, and a special acknowledgment is due to Mr. C. Pinkham, Manager of the G.E.C. Publicity Organisation, for the interesting and instructive visit.

German Railway Film Display to British Railway Officers

The Railway Research Service, which acts as the official liaison office between the British, Colonial, Dominion, and foreign railway administrations (including certain British-owned railways in South America) on Tuesday last invited a number of railway officers to a private film display showing the progress achieved on the German State Railway by the use of the instructional film. This was held at the General Post Office Film Theatre, Soho Square, through the courtesy of the Travel & Industrial Association and the General Post Office.

Mr. C. E. R. Sherrington, the Secretary of the Railway Research Service, presided, and Herr Müller-Hillebrand, Reichsbahnrat, German State Railway, Berlin, was in charge of the film display. These films had been sent specially from Berlin for the occasion. Herr Müller-Hillebrand is the head of the German Railway Film Service, and is visiting Great Britain with the object of studying the progress that has been made in this connection on the British railways.

A lecture and display of films was also given to the Southern Railway Lecture and Debating Society on Monday evening by Herr Müller-Hillebrand, and before leaving this country he will visit the L.M.S.R. mobile instructional film unit, the L.M.S.R. private film theatre, and the L.N.E.R. new cinema coach.

The films forwarded to this country by Herr Müller-Hillebrand include the following selection shown on Tuesday: " Work and Progress " (a review of developments on the Reichsbahn in 1936); " Electrification of the Höllentalbahn; " Blue Riband of the Rails " (showing the construction and trial runs of an " 05 " class 4-6-4 streamlined steam locomotive); " So wird rangiert " (an instruction in the Reichsbahn methods of shunting and marshalling trains); " Was die Eiche rauscht " (" what the old oak tree whispers "—a coloured cartoon). Among those present at Tuesday's film display were the following:—

Ministry of Transport.—Col. A. H. C. Trench, R.E., and Lt.-Col. E. Woodhouse, R.E., H.M. Inspecting Officers of Railways; Major G. R. S. Wilson, R.E., H.M. Assistant Inspecting Officer of Railways.

Great Western Railway.—Messrs. G. E. Orton, Commercial Assistant to the Superintendent of the Line; and H. H. Phillips, Superintendent of the Line's Office, Paddington.

London & North Eastern Railway.—Messrs. C. Dandridge, Advertising Manager; V. M. Barrington-Ward, Superintendent, Western Section, Southern Area; A. H. Peppercorn, Locomotive Running Superintendent, Southern Area; and J. W. Oddy, Assistant to Passenger Manager, Southern Area.

Southern Railway.—Messrs. F. G. Cole, Technical Assistant to Electrical Engineer; and J. Masterton, Advertising Assistant (Photographic Section).

London Passenger Transport Board.—Messrs. J. P. Thomas, General Manager, Railways; A. R. Cooper, Chief Engineer; W. C. Graff-Baker, Chief Mechanical Engineer; Evan Evans, General Superintendent; E. Graham, Mechanical Engineer (Maintenance); J. H. Condy, Assistant Engineer (Permanent Way); and R. Falshaw Morkill, Assistant Signal Engineer.

German State Railway.—Miss von Jagow.

Canadian National Railways.—Messrs. C.H.V. Winter, Assistant to European Manager; and F. J. Gemmell Smith, Publicity Representative.

Canadian Pacific Railway.—Mr. Wm. Lyon.

Victorian Government Railways.—Mr. H. P. Colwell, Chief Electrical Engineer.

Institute of Transport.—Mr. F. W. Crews, Assistant Secretary.

Travel & Industrial Association.—Messrs. Meredith and Primrose.

British-Argentine Railway Committee.—Mr. R. Graham, Secretary.

Brig.-Gen. Sir H. O. Mance, K.B.E., C.B., C.M.G., D.S.O.; Lt.-Col. P. Brooke-Hitching; Messrs. J. A. Kay and Charles E. Lee, THE RAILWAY GAZETTE.

G.W.R. EMPLOYEES' EXHIBITION AT PADDINGTON.—The 11th annual exhibition of Arts and Crafts organised by the Great Western Railway, is being held in the general meeting room at Paddington station from November 22 to November 27. Record entries have been received for this year's exhibition, for which an unusually wide variety of work has been submitted from all parts of the system. Exhibits range from a water-colour of the Coronation illuminations at Newport, to a mat in the shape of a mariner's compass made from old rope yarns; from a model locomotive to a mouse trap; and from a china cabinet to a toy elephant. All passengers passing through Paddington station are invited to visit the exhibition, which is open from 10.0 a.m. to 9.0 p.m. The principal awards will be presented by the Chairman of the company, the Right Hon. Viscount Horne, at 3.0 p.m. today (Friday, November 26).

PARLIAMENTARY NOTES

Co-ordination of Transport

Mr. F. B. Simpson (Ashton-under-Lyne—Lab.) on November 17 moved a resolution declaring that co-ordination of transport was essential, and that complete co-ordination could be secured only through unified public ownership. He said that British railway administration was as good as and, in many respects, possibly better than any other in the world. In so far as railway progress in this country had been in the public interest, it had followed, however tardily, the principle adumbrated in his motion. The largely negative attitude of British Governments to the railways was in strange contrast to the positive attitude adopted abroad. Under pressure of necessity the number of railway companies had been reduced from about 1,000 to the four principal companies with which they were familiar today. Obviously, the next step should be the welding of the existing rail systems, eliminating waste and overlapping and securing standardisation in essentials, without stultification of means and methods of progressive service. He was appreciative of the fact that in some directions the railways had indulged in enterprise that one was loth to condemn as an effort at improvement. They had, for instance, the spectacular streamlined luxury trains which were keeping railways in the news at the moment. But these aristocracies of travel under existing conditions could be created only with unfortunate repercussions on the many ordinary travellers and intermediate services, and they threw into vivid contrast the antiquated stock and services for the multitude.

Mr. F. C. Watkins (Hackney Central —Lab.), who seconded the Motion, said that the early history of the railways was characterised by some terrible mistakes. One of the worst was when they made the gauge of the railways 4 ft. 8½ in. instead of 6 ft. as Brunel* had arranged, and Brunel had to alter his gauge to the far inferior gauge of today. The railways were struggling with a weight of debt that was far larger than it ought to be to run the undertakings efficiently, while the workers were expected to earn dividends on money that was collected and spent in a wasteful way years ago. There had been some co-ordination in the realm of transport, and he suggested that it would be good business for the nation if the whole of the transport facilities were operated as a unit, and for there to be established a National Transport Board which should be charged with the responsibility of organising and co-ordinating all forms of transport in order that the utmost contribution from each one for transport services could be procured. The undertakings should be taken over on reasonable and fair compensation. The way to discover the value of the railways was to discover their profit-earning capacity and multiply that by a given and agreed number of years. On those terms compensation could be given. There were some people who talked about the railways being down and out, but that was not the case. The railways were a very profitable undertaking. Out of every pound paid for goods transport or for tickets bought through booking-office windows in 1936, 4s. 5d. was distributed to debenture holders and to shareholders. Any industry which could distribute nearly 25 per cent. of its gross revenue was certainly not an industry which was down and out. There was enough money distributed to provide for a dividend of 3¼ per cent., on the average, on all the existing railway capital. It was not the fault of the workers or of the nation that railway capital was so badly organised that certain shareholders got 5 per cent., some even more than 5 per cent., while some of the poor ordinary shareholders received little or none.

Colonel J. Sandeman Allen (Birkenhead West—C.) moved an amendment in which he declared that there were definite public advantages in having transport undertakings under both public and private ownership and operating under such measures of statutory regulation and control as might be necessary in the national interest. He suggested that the Ministry should take a census of all the abandoned railways. There were throughout the country a certain number of railways which had been abandoned, and which one saw from time to time as grass-grown tracks. Could not they be used as part of our road system, instead of spending money unnecessarily in buying new land? No real co-ordination or co-operation could be effected until the thorny question of rates had been settled. The legislation that was passed to control the railway monopoly had placed very severe restrictions on the railways, and had involved, among other things, a most amazing method of rating on the railways. So far as he could see there was no definite relation to costs in railway rating. The whole thing seemed to be based on what the traffic would bear. If they were too high the traffic would vanish, but they were levied as high as possible provided the traffic would bear it.

Sir Isidore Salmon (Harrow—C.), who seconded the amendment, said he had never seen, either publicly or privately, any way in which, if such a scheme of nationalisation of the railways were to take place, it would be a benefit to the public.

Mr. J. Henderson (Manchester, Ardwick—Lab.), supporting the motion, said that although the number of railway companies had been reduced to four there was still considerable waste. There was a redundancy of very highly paid officials operating for companies, oftentimes under cover, which were in very stern competition. In the standardisation of equipment considerable economies could be made if a national system of transport was in operation. The National Union of Railwaymen, with 340,000 members, gave evidence before the Royal Commission in support of the suggestion in the motion. It was necessary to evolve some unification and co-ordination of the transport industry in view of the conflict between road and rail interests. As far as heavy and long distance traffic was concerned, the railways were best suited to cater for that traffic. They had the huge personnel, the equipment and the experience, and he agreed that the gentlemen who managed the railways were very capable and earnest people but were round pegs in square holes. Road transport could be linked to the railways.

Mr. H. Holdsworth (Bradford S.—Lib.) believed that for some forms of transport railways were completely out of date, and that they had been supplanted by road transport. They ought to face the fact that they could not go back to their former position. Before the great development of road transport the railway companies did as they liked. Customers had to appear before them almost as suppliants at the mercy seat if they wanted their goods carried. But the competition of road transport had revolutionised the railways in this country. Their manners had improved as well as the facilities which they offered. Road competition had made the railway companies institute cheap fares. Did the House think that they would have got all the wonderful excursion facilities which had been provided in the last few years had it not been for road transport competition? Better services were also obtainable. All that was the result, not of co-ordination and regulation, but of competitive industry.

Captain Austin Hudson (Parliamentary Secretary to the Ministry of Transport) said that what the motion proposed was to nationalise the railways, road transport—both passenger and goods—canals, coastwise shipping, and according to the Mover, civil aviation as well. If the motion was carried he reckoned that they would bring under State control some 1,500,000 persons, or rather more if they brought in civil aviation. Personally he could never see anything but the greatest disadvantages in what was called nationalisation. In the case of an industry with the ramifications of transport the suggestion seemed to him to be little short of madness. They could get co-ordination without State ownership. Members on the Government side agreed that a certain measure of statutory control was necessary in the national interest.

* The gauge adopted by Brunel for the G.W.R. and associated lines was, of course, 7 ft. 0¼ in.—ED. *R.G.*

It was, however, their policy to encourage co-ordination by voluntary methods, supported, where necessary, by legislative action. He hoped, therefore, that the House would reject the Motion and support the Amendment.

Mr. A. G. Walkden (Bristol South—Lab.) said that no one should blame the great main-line railways for not doing what they could not do. They could not develop as they would, or would have developed if they had had the benefit that public ownership would give them. What they needed was new capital to develop their business to meet modern requirements, but under private enterprise they could not be enterprising enough. The main-line companies had recently had to meet certain labour claims, which were absolutely fair. The cost of meeting those claims and restoring the cuts, which had been a hardship since 1931, was £3,000,000. This year the railway companies had had the benefit of an increase in revenue amounting to a solid £6,000,000 on the year, that was to say, twice as much as they needed in new money to pay for the improvement in labour conditions. But, they had gone to the Railway Rates Tribunal and, having put their case with superb ability, had been given power to lay on the public additional charges which would bring them in another £4,000,000. They had, therefore, £10,000,000 with which to meet their difficulties. Labour received £3,000,000 and the public had to provide £4,000,000.

Sir Charles Gibson (Pudsey and Otley—C.): What are their increased expenses?

Mr. Walkden replied that they had not published their increased expenses, but those who were associated with the railways knew that they were always effecting increasing economies, and they were not afflicted at all seriously with increased expenses as against the solid £6,000,000 of new money that had come in.

Mr. Herbert Morrison (South Hackney—Lab.) said that the conflict of road and rail was a senseless business. It was not in the interests of transport, and not in the interests of the country. He pointed out that since the Transport Board had existed, wage conditions had improved by over £1,000,000 a year. Tube extensions had been made, without a State subsidy, although, he agreed with a State guarantee; but there was nothing improper about a State guarantee to a public authority. There was not a State subsidy as in the case of the Morden tube. Electrification was being carried out on the Great Eastern, and the old Metropolitan private enterprise rolling stock had been steadily improved. Private enterprise was far from perfect in many ways. Sometimes it gave too much transport and sometimes too little. Sometimes there was poor rolling stock. Could any railway director tell him why it was that at many railway stations in the provinces, one found difficulty in knowing where one was because they kept the name of the station secret? It was known that there were many imperfections in private enterprise, but it was known that public enterprise, in various directions, had proved itself to be sound and in the interests of the community.

The motion was negatived by 163 votes to 95, and the debate on the amendment was automatically adjourned under the rules of the House.

QUESTIONS IN PARLIAMENT

Wimbledon Station Accident

Mr. Will Thorne (Plaistow—Lab.) on November 18 asked the Minister of Transport, if he could give the House any information in connection with the accident at Wimbledon station on Monday night when a man was badly injured; and if he could say what was the cause of the accident.

Dr. Leslie Burgin (Minister of Transport): I have not yet received full details of this accident, but I am appointing an officer to hold an inquiry and await his report.

Accident at Millwall

Mr. Will Thorne (Plaistow—Lab.) on November 18 asked the Home Secretary whether he could give the House any information in connection with a man killed at a railway arch at Millwall the previous Friday; and whether he was aware of the comment made by the jury.

Sir Samuel Hoare (Secretary of State for the Home Department): I understand that this unfortunate fatality occurred in connection with the demolition of an archway. The jury recommended that greater precautions should be taken during the rest of the work and it was intimated at the inquest that this would be done. Operations of this kind are not at present subject to the Factory Acts and Regulations, but will come within the new Factories Act next year.

Indian State Railways

Sir Nairne Stewart Sandeman (Middleton and Prestwick—C.) on November 22 asked the Under Secretary of State for India, whether the Government of India had accepted the proposal of the Wedgwood Committee to raise the amount in the Indian State Railways depreciation reserve fund to a minimum of £22½ million.

Lord Stanley (Under Secretary of State for India): The recommendations of the Wedgwood Committee, including the opinion expressed as to the size of the depreciation fund, are at present under the consideration of the Government of India.

Sir Nairne Stewart Sandeman: Is the Minister not aware that the depreciation fund has been very much depleted because of losses in the past, and that to keep up the rolling stock and the railways it is essential to get this fund brought back to its original form?

Lord Stanley: That is one of the subjects now being considered by the Government.

Late Trains Between Glasgow and Edinburgh

Mr. Robert Gibson (Greenock—Lab.) on November 22 asked the Minister of Transport if he had further considered the poor service of late trains between Glasgow and Edinburgh, there being no train leaving Glasgow for Edinburgh from Monday to Friday after 9.50 p.m., and also the representations that complaints had been made to both railway companies who had not replied to the complainers; and if he had any further statement to make on the matter.

Captain Austin Hudson (Parliamentary Secretary to the Ministry of Transport): We have communicated again with the railway companies, who assure us that the potential traffic would not justify a service later than the train which now leaves Glasgow for Edinburgh at 10 p.m., on Mondays to Fridays. They ran a train from Queen Street to Edinburgh at 10.40 p.m. on these days from May, 1927, to September, 1930, but had to withdraw it owing to lack of patronage. The companies cannot trace receipt during the last year of any written representation as to the need of a later service.

Edgware & Morden Tube

Sir Reginald Blair (Middlesex, Hendon—U.) on November 24 asked the Minister of Transport if his attention had been directed to the recent increase of overcrowding on the Edgware and Morden tube, particularly between Golders Green station and the West End, and that the timetable had been altered and trains were less frequent; and would he make representations to improve such conditions, especially at the rush hours.

Dr. Leslie Burgin (Minister of Transport): I am informed by the London Passenger Transport Board that the service from Golders Green to the West End was recently increased during the morning peak hours by two trains. Compared with last winter, this service shows a total increase of four trains, and the service from Edgware an increase of two trains. As regards the number of trains, this line is now worked to its full capacity. The board is not aware that there has been any general increase of the overcrowding which exists during certain hours owing to the fact that the majority of passengers travel at about the same time in the morning and evening.

NOTES AND NEWS

Air-Conditioned Cars in U.S.A.—On October 1 last, the Class I railroads of the United States had 5,196, and the Pullman Company, 4,666 air-conditioned passenger cars in operation.

Large South African Locomotive Orders.—Details are given on our Contracts and Tenders page this week of orders for a total of 210 steam locomotives placed by the South African Railways and Harbours Board.

Northern Counties Committee (L.M.S.R.).—Traffic receipts of the Northern Counties Committee for the first 45 weeks of the current year amount to £346,148, an increase of £4,840 or 1·42 per cent.

Derailment of U.S.A. Express.—On Saturday, November 20, the Washington-Norfolk Western express was derailed near Bluefield, West Virginia. As a result, one carriage rolled down an embankment into a river. Casualties are reported as two dead and about 70 injured.

L.N.E.R. Pacific Named "Sir Nigel Gresley."—The hundredth Gresley Pacific locomotive of the L.N.E.R. is today (Friday) to be named *Sir Nigel Gresley* (after their designer, the Chief Mechanical Engineer of the company) in a ceremony at 11.30 a.m. at Marylebone station. A presentation to Sir Nigel Gresley of a silver model of the locomotive will be made by Mr. William Whitelaw, Chairman of the L.N.E.R. The engine, No. 4498, is one of the streamlined series, in the blue livery.

L.N.E.R. Gift to Imperial War Museum.—The L.N.E.R. has presented to the Trustees of the Imperial War Museum a model of the steamship *Immingham*, formerly an important vessel in the Great Central Railway Company's fleet sailing from Grimsby on various Continental services. This vessel had an interesting history. She was built by Swan, Hunter & Wigham Richardson Limited on the Tyne in 1907, and had a speed of 18 knots. On the outbreak of war in 1914 she was taken over by the Admiralty and served as stores and ammunition carrier for the Mediterranean Fleet until June 12, 1915, when she was sunk in collision off Lemnos.

Air Raid Precautions on the L.M.S.R.—As part of a general scheme for the L.M.S.R., the company has just completed at its Wolverton works the first mobile instructional unit for the instruction of the staff in air raid precautions to be introduced by a British railway company. This unit consists of two specially-equipped coaches, one of which is equipped for decontamination work, and the other fitted as a lecture room with accommodation for a class of 30. The L.M.S.R. proposes to train 23,000 of its staff in the methods approved by the Home Office in dealing with the consequences of an air raid. This unit is to make a demonstration tour of the company's system in England, Scotland, and Wales.

First Class Cheap Evening Travel.—On November 1 the London Passenger Transport Board extended to first class passengers the facilities of cheap evening tickets (issued after 6 p.m.) from outer suburban stations to the West End. Previously the concession applied only to third class travellers. The West End fare zone includes Piccadilly, Leicester Square, Oxford Circus, and Charing Cross stations. Similar facilities apply to main-line railway stations issuing cheap evening tickets for third class travel.

Southern Railway Musical Society.—From Wednesday to Saturday evening last week the Southern Railway Musical Society gave three performances at the Fortune Theatre of the spectacular light opera "The Student Prince." The whole of the performance maintained a high standard and Mr. Leslie Woollett as Prince Karl Franz, Mr. A. W. Baldwin as Lutz, Miss Eveline Swales as Kathie, Miss Doris James as Princess Margaret, and Miss Marjorie Bowen-Walters as Gretchen, and other players, and the large chorus and members of the orchestra, distinguished themselves as on previous occasions. On Friday evening the performance was witnessed by a large number of guests invited by the General Manager and chief officers of the company. Southern Railway officers present included: Mr. Gilbert Szlumper, General Manager; Mr. E. J. Missenden, Traffic Manager; Mr. J. B. Elliot, Assistant General Manager; Mr. O. Bulleid, Chief Mechanical Engineer; Mr. R. M. T. Richards, Assistant Traffic Manager; Mr. C. A. G. Linton, Assistant Engineer; and Mr. C. Cooper, Assistant for Continental Traffic.

Improvement Scheme at Porthcawl, G.W.R.—The G.W.R. is to undertake at Porthcawl an extensive improvement scheme which provides for the complete rebuilding of the existing station, the doubling of the remaining single-line section, 2½ miles in length, of the Pyle–Porthcawl branch line, and improved through running facilities with the main line at Pyle. The new station will have seven platforms, which will radiate from a large circulating area around which will be situated booking offices, cloakrooms, waiting rooms and other offices. The front of the station will provide accommodation for shops which will face on to a broad new approach road. The extension of the station will necessitate the removal of the existing goods shed, and a new shed and warehouse will be constructed in an altered position. The carriage sidings will be moved to a new position at the Pyle end of the station, where a nest of eight sidings, 940 to 1,150 ft. in length, will be laid out. A locomotive turntable, capable of taking the largest engines in use, will be installed adjoining. No facilities are at present available for the running of through trains to Porthcawl from stations west of Pyle. It is, therefore, proposed to construct a new loop line which will provide a direct junction. This work will necessitate the construction of a new bridge to carry the Porthcawl–Pyle road and the provision of a signal box at each end of the loop line.

Withdrawal of Pioneer 4-4-2 Locomotive on British Railways.—The L.N.E.R. withdrew from service on November 23, No. 3990, *Henry Oakley*, the pioneer Atlantic type locomotive to run on British railways. This engine appeared from the Great Northern Railway works at Doncaster in 1898, and was the first of the "990" class introduced by the late Mr. H. A. Ivatt. Constructed to haul the predecessor of the Flying Scotsman and similar expresses between King's Cross and York, this locomotive, which in its lifetime has covered approximately 1,200,000 miles, will, not be broken up, but will, we understand, be preserved in the Railway Museum at York. The engine was named after Mr. (later Sir) Henry Oakley, General Manager of the G.N.R. 1870-98.

Funeral Service for Sir Seymour Tritton.—The funeral service for Sir Seymour Tritton, whose death is recorded on page 930, was held on Wednesday, November 24, at St. Stephen's, Rochester Row, Westminster. The Rev. Shepley S. Smith and the Rev. A. J. Meek officiated. Amongst those present were:—

Mr. Julian Tritton and other family mourners; Mr. Playford, Mr. W. W. Legg (also representing Mr. J. A. Kay), Mr. C. N. Goodall, Mr. S. T. Gresham, Commander Gaud, Mr. E. C. Poultney, Mr. F. S. Whalley, Sir John Thornycroft, Mr. C. P. Sandberg, Mr. A. C. Carr, Mr. G. Pettigrew Smith, Mr. E. Brynmor Rees (representing the United Steel Company), Mr. F. J. Kuretschka (Managing Director, Caprotti Valve Gears & Associated Locomotive Equipment Company), Mr. O. W. Watkins (representing Indian State Railways), Mr. G. H. Ormerod (representing Assam-Bengal Railway Company), Mr. W.G. Hornett (Director, Sentinel Waggon Works), Major D. G. Shelley and Mr. S. G. S. Young (representing the Bombay, Baroda & Central India Railway Company), Mr. H. Horsburgh and Mr. J. W. Spiller (representing the Crown Agents for the Colonies), Mr. W. T. Gibson (representing the Hon. Philip Henderson, senior partner, Livesey & Henderson), Mr. F. Lydall (representing Merz & McLellan), Major H. A. Harrison (Secretary, Institution of Locomotive Engineers), Mr. T. Potter (representing the Gloucester Railway Carriage & Wagon Company).

Mr. A. J. Boyd (representing theMetropolitan-Cammell Carriage & Wagon Company), Mr. Reginald Turner (representing the Madras & Southern Mahratta Railway Company), Mr. R. Mowbray (Government Director, Indian Railways), Mr. Thomas McMurray (Director, William Simons & Co.), Mr. G. H. Crowe (representing Dorman, Long & Co.), Mr. L. J. Le Clair (representing Westinghouse Brake & Signal Company), Mr. H. C. Richardson (Director, Messrs. Ibbotson Bros. & Co.), Mr. Charles Dresser (representing British Standards Institution), Mr. Charles G. Young (representing East Indian Railway Company), Mr. J. Clayton (Personal Assistant to Chief Mechanical Engineer, Southern Railway), Mr. H. G. Ivatt (representing Mr. W. A. Stanier, Chief Mechanical Engineer, L.M.S. Railway), and many representatives of the staff of Messrs. Rendel, Palmer & Tritton.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 46th Week			Totals to Date		
	1937	1936	Inc. or Dec.	1937	1936	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,867 mls.)						
Passenger-train traffic...	406,000	393,000	+ 13,000	24,034,000	23,095,000	+ 939,000
Merchandise, &c. ...	541,000	519,000	+ 22,000	22,848,000	22,137,000	+ 711,000
Coal and coke ...	302,000	263,000	+ 39,000	11,731,000	11,032,000	+ 699,000
Goods-train traffic ...	843,000	782,000	+ 61,000	34,579,000	33,169,000	+1,410,000
Total receipts	1,249,000	1,175,000	+ 74,000	58,613,000	56,264,000	+2,349,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	275,000	266,000	+ 9,000	15,751,000	15,056,000	+ 695,000
Merchandise, &c. ...	390,000	360,000	+ 30,000	15,711,000	15,145,000	+ 566,000
Coal and coke ...	287,000	245,000	+ 42,000	11,441,000	10,691,000	+ 750,000
Goods-train traffic ...	677,000	605,000	+ 72,000	27,152,000	25,836,000	+1,316,000
Total receipts	952,000	871,000	+ 81,000	42,903,000	40,892,000	+2,011,000
G.W.R. (3,738½ mls.)						
Passenger-train traffic...	169,000	168,000	+ 1,000	10,089,000	9,818,000	+ 271,000
Merchandise, &c. ...	214,000	206,000	+ 8,000	9,280,000	8,888,000	+ 392,000
Coal and coke ...	126,000	113,000	+ 13,000	5,148,000	4,619,000	+ 529,000
Goods-train traffic ...	340,000	319,000	+ 21,000	14,428,000	13,507,000	+ 921,000
Total receipts	509,000	487,000	+ 22,000	24,517,000	23,325,000	+1,192,000
S.R. (2,155 mls.)						
Passenger-train traffic...	257,000	250,000	+ 7,000	15,043,000	14,318,000	+ 725,000
Merchandise, &c. ...	65,000	63,000	+ 2,000	2,886,500	2,926,000	− 39,500
Coal and coke ...	34,000	33,000	+ 1,000	1,373,500	1,407,000	− 33,500
Goods-train traffic ...	99,000	96,000	+ 3,000	4,260,000	4,333,000	− 73,000
Total receipts	356,000	346,000	+ 10,000	19,303,000	18,651,000	+ 652,000
Liverpool Overhead ... (6½ mls.)	1,227	1,163	+ 64	59,856	55,011	+ 4,845
Mersey (4½ mls.) ...	4,289	4,339	− 50	193,103	187,841	+ 5,262
*London Passenger Transport Board ...	550,000	562,100	− 12,100	11,809,200	11,778,200	+ 31,000
IRELAND						
†Belfast & C.D. pass. (80 mls.)	1,782	1,787	− 5	119,548	120,823	− 1,275
,, ,, goods	480	580	− 100	22,245	25,017	− 2,772
,, ,, total	2,262	2,367	− 105	141,793	145,840	− 4,047
Great Northern pass. (543 mls.)	8,000	7,850	+ 150	515,800	500,900	+ 14,900
,, ,, goods	9,750	10,250	− 500	435,550	451,200	− 15,650
,, ,, total	17,750	18,100	− 350	951,350	952,100	− 750
Great Southern pass. (2,076 mls.)	27,150	25,967	+ 1,183	1,695,898	1,675,091	+ 20,807
,, ,, goods	59,355	58,541	+ 841	1,960,697	1,993,937	− 33,240
,, ,, total	86,505	84,508	+ 1,997	3,656,595	3,669,028	− 12,433

* 21st Week (before pooling) † 47th Week

A Christmas Relief Train Innovation, L.N.E.R.

A departure in train operating is being made by the L.N.E.R. in connection with the Christmas holiday traffic this year. In previous years numerous trains have been run in several parts, each group of trains stopping at the same stations, but passengers have shown a reluctance to travel in the relief parts, with the result that the original trains have been overcrowded and the reliefs comparatively lightly loaded. To overcome this difficulty, in addition to duplication, various reliefs will serve different stations and omit intermediate stops so that passengers will be more evenly divided over the trains and will be able to enjoy uninterrupted non-stop runs to their various destinations.

This arrangement will necessitate some long non-stop runs. For example, on December 23, a relief train to the 10.0 a.m. Flying Scotsman (which calls at Grantham, York, Newcastle and Berwick en route to Edinburgh) will leave King's Cross at 9.30 a.m. and run non-stop to Edinburgh, 392.7 miles. A relief to the 1.20 p.m. Edinburgh express will run non-stop to Newcastle, 268·3 miles; and reliefs to the 4.9 p.m. North of England express will run non-stop to Newcastle and Doncaster respectively. On Christmas Eve there will be additional non-stop trains to Edinburgh, Darlington, Newcastle and Leeds. On Christmas Day last year over 400 passengers travelled by the 11.15 a.m. train to Newcastle, so arrangements have been made this year to ensure ample accommodation by running an additional express stopping at York (188·2 miles), Darlington and Newcastle only. All the principal restaurant and sleeping car trains from King's Cross to the North will be run in several parts every day during Christmas week, the 14 normal expresses being replaced by 50 on Christmas Eve.

British and Irish Railway Stocks and Shares

Stocks	Highest 1936	Lowest 1936	Prices Nov. 24, 1937	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	64¼	45½	60¾	−1
5% Con. Prefce. ...	126½	116¾	117	−1
5% Red.Pref.(1950)	113	108½	110½	—
4% Deb.	119½	110½	108	−1
4½% Deb.... ...	121	114	111	—
4½% Deb.... ...	129	121	117½	—
5% Deb.	141	134	128½	—
2½% Deb.... ...	79⅛	74	69½	—
5% Rt. Charge ...	136½	130	127½	—
5% Cons. Guar. ...	135¼	127¾	124½	−½
L.M.S.R.				
Ord.	35⅝	17	28¼	−¾
4% Prefce. (1923)	83	52½	68	−3½
4% Prefce. ...	92¾	81	79½	−2
5% Red.Pref.(1955)	109¼	103¼	106	—
4% Deb.	111¾	105 9/16	105	−½
5% Red.Deb.(1952)	119⅝	115½	113½	—
4% Guar. ...	106¾	101⅝	100½	—
L.N.E.R.				
5% Pref. Ord. ...	14	9	8	—
Def. Ord.	7¼	4¾	4⅛	—
4% First Prefce.	79¼	55¼	65½	−2
4% Second Prefce.	31⅞	18¼	24½	−1
5% Red.Pref.(1955)	100½	77¾	97½	−2
4% First Guar. ...	104½	98¾	94	−1½
4% Second Guar.	99	90	88	−1
3% Deb.	85¾	79	78½	−½
4% Deb.	109¾	104½	103	−½
5% Red.Deb.(1947)	116¼	110½	110½	—
4½% Sinking Fund Red. Deb.	111½	107½	108	—
SOUTHERN				
Pref. Ord.... ...	98¾	82½	85½	−½
Def. Ord.	27⅝	20⅛	19	−¼
5% Pref.	120¾	118½	114½	−½
5% Red.Pref.(1964)	119¾	115¼	113½	—
5% Guar. Prefce.	136	129½	124½	−½
5% Red.Guar.Pref. (1957)	120	115¾	115	—
4% Deb.	117 5/16	109½	107	−½
5% Deb.	140	134	127½	—
4% Red. Deb. 1962–67	116½	110	106½	—
BELFAST & C.D.				
Ord.	9	4½	4½	—
FORTH BRIDGE				
4% Deb.	107	105	102½	—
4% Guar. ...	107 5/16	104	101½	—
G. NORTHERN (IRELAND)				
Ord.	19½	9¾	6	—
G. SOUTHERN (IRELAND)				
Ord.	63	41	27	—
Prefce.	65	46	35	−4
Guar.	97¼	81	70½	—
Deb.	99¾	83¼	86	−½
L.P.T.B.				
4½% "A" ...	127¾	121	117½	+1
5% "A" ...	138¼	133½	127½	—
4½% "T.F.A." ...	111½	108½	107	—
5% "B" ...	131¾	123¾	120½	—
"C"	112½	93	81	—
MERSEY				
Ord.	40¾	23	24½	—
4% Perp. Deb. ...	103	98	97	—
3% Perp. Deb. ...	78	74⅝	74½	—
3% Perp. Prefce.	68⅞	63¼	66½	—

CONTRACTS AND TENDERS

Large South African Locomotive Orders

The South African Railways & Harbours Administration has placed orders for a total of 210 3-ft. 6-in. gauge steam locomotives divided as follow :—

North British Locomotive Co. Ltd. ; 44 Class " 15F " main-line general utility 4-8-2 type, to be fitted with steel fireboxes, and mechanical stokers.

Henschel & Sohn, A.G. ; 85 Class " 23 " main-line 4-8-2 type, to be fitted with steel fireboxes and mechanical stokers.

Berliner Maschinenbau, A.G. (vormals L. Schwartzkopff) ; 31 Class " 23 " main-line 4-8-2 type, to be fitted with steel fireboxes and mechanical stokers.

Skoda Locomotive Works, Fried. Krupp A.G., and Borsig Lokomotiv Werke, G.m.b.H., respectively ; 15, 17, and 18 Class " 19D " branch-line 4-8-2 type, to be fitted with steel fireboxes ; if, however, the axle loads permit, the Skoda locomotives are to have copper fireboxes.

The 44 locomotives to be built by the North British Locomotive Co. Ltd. are to have Timken roller bearings on engine, bogie and tender wheels. The remaining locomotives are to have Skefko bearings on engine, bogie and tender wheels. The orders for Krupps and Borsigs are each increases to 40 locomotives on the orders recently placed with these firms, as recorded on this page in our issue of October 29, 1937.

G.W.R. to add to Partition Wagons

So successful has been the special type of G.W.R. partitioned goods wagon in reducing damage in transit to soft fruit and such fragile freight as eggs and furniture, that the company has decided to build 50 more of the vehicles. The wagons are fitted with a series of adjustable partitions which hold the stacked goods firmly in position, however small the load in the truck may be. Damage to the goods from shock or displacement by the starting, stopping or shunting of trains is thus reduced to a minimum. The wagons were first introduced eighteen months ago and the G.W.R. now has 165 in use.

Dorman, Long & Co. Ltd. has received a contract from the London Passenger Transport Board for a new bridge to carry the Hammersmith & City Railway over Ladbroke Grove, near Ladbroke Grove station. The new bridge is to be of all-welded construction, and will be the first of its type and size in Great Britain.

Jessop & Co. Ltd. has received an order from the Bengal-North Western Railway for the construction in India of 400 four-wheeled wagons without couplers and wheels and axles.

Skoda Works Limited has received an order for the supply of wheels and axles required for the above mentioned wagons.

Kitson & Co. Ltd. has received an order from the Crown Agents for the Colonies for one 0-8-0 tank shunting locomotive for the Jamaica Government Railways.

The Metropolitan-Cammell Carriage & Wagon Co. Ltd. has received an order from the Crown Agents for the Colonies for two bogie inspection saloons for the Gold Coast Government Railways.

L.N.E.R. 1938 Carriage-Stock Programme

The L.N.E.R. 1938 carriage-stock building programme provides for a total of 730 new coaches with a total seating capacity of 37,000. Of these, 481 will be of vestibuled or corridor types for main-line service. An extra third class streamlined coach for the Silver Jubilee train is included in the programme, and two new fifteen-coach train sets of an entirely new design are to be built for the Flying Scotsman service. A new train is also to be provided for the Hook of Holland boat express between Liverpool Street and Harwich, together with new cross-country trains for the Newcastle-Hull and Newcastle-Liverpool routes, and for intermediate services between Edinburgh and Darlington, York and Perth, and the holiday traffic between Liverpool Street, Yarmouth, and Cromer. Of the 247 non-vestibuled vehicles to be built during 1938 the majority are for suburban traffic. Four new suburban trains will be provided for the service from Marylebone ; nine new trains for use between Darlington and Saltburn ; three for the Edinburgh district ; two for Helensburgh-Glasgow services, and one for the Dundee area. A new tourist-car train is being built for service in Scotland, and for the accommodation of pleasure parties 72 specially designed open cars will be constructed.

Large L.N.E.R. Electrification Contract

British Insulated Cables Limited has been awarded two important railway electrification contracts to the total value of over one million pounds, by the L.N.E.R. The contracts cover the design, manufacture, and erection of the complete overhead equipment required for the Manchester-Sheffield line, together with the mineral line to Wath-on-Dearne (75 route miles), and the suburban lines from Liverpool Street and Fenchurch Street to Shenfield (25 route miles), amounting to approximately 300 and 100 single track miles respectively. The 1,500-volt d.c. system with catenary construction is to be used, and special work will be called for in the approaches to the various termini as well as in the Woodhead tunnel. These new contracts will require some 8,500 tons of steelwork, 3,000 tons of copper, and many thousands of fittings, and it is estimated that the work will take about two and a half to three years to complete.

Andrew Barclay, Sons & Co. Ltd. has received an order from the Air Ministry for two 150-b.h.p. diesel locomotives and another for two locomotives of the same output from the War Office. Vulcan-Sinclair fluid couplings and Wilson gearboxes are incorporated in all four locomotives.

The Bombay, Baroda & Central India Railway Administration has placed orders, to the inspection of Messrs. Rendel, Palmer & Tritton, with Alfred Herbert Limited for one universal turret lathe, and with Dean, Smith & Grace Limited for one tool-room centre lathe.

Whitelegg & Rogers Limited has received orders for 256 Ajax axlebox grease lubricators for application to 4-8-2 + 2-8-4 type Beyer-Garratt locomotives now under construction by Beyer Peacock & Co. Ltd., for the South African Railways & Harbours Board ; and orders for 300 Ajax axlebox grease lubricators from the Madras & Southern Mahratta Railway for the conversion from oil to grease lubrication of 2-8-0 and 4-6-0 type locomotives.

The Belgian National Railways Administration has ordered from Belgian firms six three-car diesel-hydraulic trains ; 12 twin-car diesel-mechanical trains ; and six single diesel-mechanical railcars. Maybach engines and Voith drive are being used for the largest trains, and Carels-Ganz engines and S.L.M.-Winterthur transmission for the remaining vehicles Further particulars will be found in this week's issue of our *Diesel Railway Traction Supplement.*

T. Robinson & Son Ltd. has received an order from the Central Uruguay Railway for one motor-driven two cutter planing and thicknessing machine and one motor-driven vertical band resawing machine.

The Associated Equipment Co. Ltd. has received the following orders from railway associated road transport operators :—

Bristol Tramways & Carriage Co. Ltd. ; 18 Regal passenger vehicles.

Northern General Transport Co. Ltd. ; two Regal passenger vehicles.

Sheffield United Tours Limited ; one Regal passenger vehicle.

Sheffield Corporation ; 13 Regal and 10 Regent passenger vehicles.

Halifax Joint Committee : seven Regal and eight Regent passenger vehicles.

Halifax Corporation ; 4 Regal and 15 Regent passenger vehicles.

Carter Paterson & Co. Ltd. ; two Monarch goods vehicles.

Tenders are invited by the Bombay, Baroda & Central India Railway Administration receivable by December 10, at The White Mansion, 91, Petty France, Westminster, S.W.1, for the supply of carriage and wagon wheels and axles.

Tenders are invited by the Bengal-Nagpur Railway Administration, receivable at 132, Gresham House, Old Broad Street, London, E.C.2, by December 8, for the supply of eight superheated boilers for " B " class engines and eight superheated boilers for " C " class engines.

The Johannesburg City Council is calling for tenders, to be presented in South Africa by December 18, for the supply of one diesel locomotive for use on 2 ft. gauge track. Firms desirous of offering a locomotive of United Kingdom manufacture can obtain further details from the Department of Overseas Trade.

OFFICIAL NOTICES

Bengal-Nagpur Railway Company Limited

THE Directors are prepared to receive Tenders for :—

8 SUPERHEATED BOILERS FOR B. CLASS ENGINES;

8 SUPERHEATED BOILERS FOR C. CLASS ENGINES.

Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after November 24, 1937.

A fee of 20s. will be charged for each copy of the Specification, which is *NOT* returnable.

Tenders must be submitted not later than Noon on Wednesday, 8th December, 1937.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
T. R. WYNNE,
Managing Director.

THE MADRAS & SOUTHERN MAHRATTA RAILWAY COMPANY LIMITED invite Tenders for :—

(*a*) 746 STEEL TYRES FOR LOCOMOTIVES, CARRIAGES AND WAGONS;
(*b*) 14 PLATE GIRDER DECK SPANS (HIGH TENSILE STEEL);
64 FEET IN THE CLEAR.

Specifications and Forms of Tender can be obtained at the Company's Offices, 123, Victoria Street, Westminster, London, S.W.1.

Fee ONE GUINEA each, *which will not be returned.*

Tenders for (*a*), 746 Steel Tyres, must be submitted not later than 2 o'clock p.m. on Tuesday, 14th December, 1937, and Tenders for (*b*), 14 Plate Girder Deck Spans, not later than 2 o'clock p.m. on Friday, 31st December, 1937.

The Directors do not bind themselves to accept the lowest or any Tender and reserve to themselves the right of reducing or dividing the orders.

By Order of the Board,
G. W. V. DE RHE PHILIPE,
Secretary.

WANTED, to get in touch with makers of Railway Wagon Axle-box Lubricating Pads.—Apply Box No. 2411, c/o THE RAILWAY GAZETTE, 33, Tothill Street, London, S.W.1.

WANTED for service in Peru, Foreman Mechanic with experience in operation and maintenance of diesel and ignition engines.—Apply THE SECRETARY, PERUVIAN CORPORATION LTD., 144, Leadenhall Street, E.C.3.

THE owners of Patent No. 392,050, which relates to Guards for Crossing Highways and Railway Level Crossings, wish to enter into negotiations either for the grant of licences or for the sale of the patent. Enquiries should be addressed in the first place to ANDREWS & BYRNE, 329, High Holborn, London, W.C.1.

STAFF AND LABOUR MATTERS

Electricity Supply Industry—Wages

At a meeting of the National Joint Industrial Council for the Electricity Supply Industry, held at the Ministry of Labour on Friday, November 19, settlement of a claim for a general advance of 3d. an hour in wages, submitted by the employees' side of the council, was reached. The council decided that on and from December 1 there shall be an increase of ¾d. an hour on the schedule rates of all employees engaged in the generation and distribution of electricity included in the various district schedules.

Hours of Road Motor Drivers

The Institution of British Launderers Limited, and the Associates Committee of the British Road Federation Limited, have made applications to the Minister of Transport for an Order varying the hours of drivers of "C" licence vehicles during the 1937 Christmas trading period. The variation applied for is that the period of eleven hours laid down in Section 19 (1) (ii) of the Road Traffic Act, 1930, may be increased to twelve hours on not more than two days in each of the three weeks ending on December 18 and 25, 1937, and January 1, 1938; the variation to apply only to drivers of vehicles whose use is authorised under a "C" carrier's licence granted under Part I of the Road and Rail Traffic Act, 1933. The applications suggest that any Order made should be of a permanent nature applicable to successive Christmas seasons. The applications have been referred to the Industrial Court, before which they will be heard on Friday, November 26.

Workmen's Compensation

When the second reading of the Workmen's Compensation Bill was moved in the House of Commons on Friday, November 19, it was explained that the Bill sought to make the insurance by employers compulsory and to substitute a medical board for the present system of single medical referees. The Bill proposed increases in the amount of compensation in the case of death, total incapacity, and partial incapacity, and that the system of lump-sum payments should be terminated. Instead of a lump-sum there should be weekly payment of 30s. or half the weekly earnings of the dead workman, whichever was the greater. In the case of total incapacity the sum payable at present was 50 per cent. of the pre-accident earnings of the workman, and the Bill proposed an increase to 75 per cent. On behalf of the Government it was suggested that at a time when new ideas were coming forward with regard to the treatment of workmen's compensation, and when everything was being investigated at the present moment by two of the strongest committees which had ever been set up by the Home Office, it was not the time to deal with the question of compensation simply on the old lines. The Government intended when the reports of these committees were received to consider, as early as possible, any recommendations which might be made for the amendment of the Act and, if accepted, to take steps in future legislation to implement them. The Bill was rejected by 205 votes to 141.

RAILWAY AND OTHER REPORTS

Midland Railway Company of Western Australia.—The directors have authorised a final payment of interest on the second mortgage cumulative income debenture stock, on account of the year ended June 30, 1937, at the rate of 3 per cent., less income tax at 5s. in the £, payable January 1, 1938, making, with the interim payment of 2 per cent. on July 1, 1937, 5 per cent. for the year.

Bengal-Nagpur Railway.—The directors have decided to recommend, at the forthcoming general meeting of members, payment of a final dividend from reserve of 5s. per cent. (¼ per cent.) on the company's capital stock, payable on January 1, 1938, together with the guaranteed interest of £1 15s. per cent. then due, making a total distribution of 4 per cent. for the year, less income tax.

Cordoba Central Railway.—Gross receipts for the year ended June 30 last, at par of exchange, compared with those of the previous year, show an increase of £250,701, or 11·43 per cent., at £2,443,159. Working expenses (£1,998,630) are higher by only £62,728, or 3·24 per cent., leaving net receipts £187,973 larger, at £444,529. The operating ratio is reduced from 88·30 per cent. to 81·81 per cent. After charging exchange differences £179,690, against £148,824, renewals £47,705, against £50,814, and 12 months' interest on the 4½ per cent. first debenture stock, there is a debit balance for the year of £150,941, making the total balance at debit of net revenue account £1,021,596. The increase in working expenses is mainly attributable to the larger volume of traffic transported, representing an increase of 26·50 per cent. in tonnage, and of 12 per cent. in revenue traffic ton-kilometrage.

Forthcoming Meetings

Nov. 26 (*Fri.*).—**Argentine North Eastern Railway Co. Ltd.** (Ordinary General), River Plate House, Finsbury Circus, E.C., at 2.30 p.m.

Nov. 29 (*Mon.*)—**United Railways of the Havana and Regla Warehouses Limited** (Ordinary General), Winchester House, Old Broad Street, E.C., at noon.

Nov. 29 (*Mon.*)—**Central Uruguay Railway Co. of Monte Video Ltd.** (Ordinary General), River Plate House Finsbury Circus, E.C., at 12.30 p.m.

Nov. 29 (*Mon.*)—**Cordoba Central Railway Co. Ltd.** (Ordinary General), River Plate House, Finsbury Circus, E.C., at 2.30 p.m.

Dec. 1 (*Wed.*).—**Paraguay Central Railway Co. Ltd.** (Ordinary General), River Plate House, Finsbury Circus, E.C., at 2.30 p.m.

Railway Share Market

Heavy liquidation in all sections of the Stock Exchange earlier in the week resulted in a general decline in prices. Subsequently buyers were attracted by the lower values, but actively-dealt-in securities are lower on balance. It is now more generally believed that sentiment has been affected unduly by fears of the possible effects of the trade recession in America, which may, after all, prove only a temporary development. Moreover, there are many indications of continued trade activity at home, one of the more important pointers being the encouraging trend shown by the railway traffic figures.

Home railway stocks declined sharply in the early part of the week and have since only made partial recovery, but they were a good deal more active when general market conditions became less uncertain. The past week's traffics were up to best expectations, and when it was known that they show an aggregate gain of £187,000 over the corresponding week a year ago, there was demand for all the junior stocks. It is realised that there is no reason why traffics should not continue to be good for the remainder of the year and that they can hardly fail to benefit in 1938 if there is no set-back in general trade conditions. L.N.E.R. second preference, which had previously declined several points, has since made partial improvement to 24½, the £81,000 gain in traffics being the largest individual rise shown by the receipts of the main line railways for the past week. Great Western ordinary stock, which had previously reacted sharply to under 59, has since rallied to 60½. In this case the past week's receipts have increased by £22,000. L.M.S.R. ordinary touched under 26 on Tuesday but is now 27¾, aided by satisfaction with the traffic gain of £74,000. Moderate recovery was also shown by the 1923 preference and 4 per cent. preference stocks. Southern deferred recovered part of an earlier reaction and is now 18¾, although the increase of £10,000 shown by the traffic return was not up to best market expectations. Prior charge and debenture stocks of the Home railways made slightly lower prices, being influenced by the tendency in British Government stocks. London Transport "C" stock has been a relatively steady feature.

Argentine and other foreign railway stocks have been inactive and on balance again moved against holders, although there was some response later in the week to the better tone of markets. The preference stocks of B.A. Gt. Southern and Central Argentine were among the more active securities, as were the ordinary stocks, although the latter continued to move irregularly. American railway issues fluctuated sharply.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1936-37	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1936	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1936	Prices: Lowest 1936	Prices: Nov. 24, 1937	Prices: Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	21.11.37	21,830	+ 4,440	47	776,320	648,590	+ 127,730	Ord. Stk.	25	15¼	11½	Nil
	Argentine North Eastern	753	20.11.37	7,103	— 2,397	21	205,430	196,849	+ 8,581	"	12	2	6	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	54	45	85	4 11/16
	Bolivar	174	Oct., 1937	3,700	— 2,200	44	53,050	63,600	— 10,550	6 p.c. Deb.	9	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	16	11½	14	3 9/16
	Buenos Ayres & Pacific	2,806	20.11.37	78,536	— 523	21	1,640,324	1,578,341	+ 61,983	Ord. Stk.	17½	6	6	Nil
	Buenos Ayres Central	190	6.11.37	$127,800	— $38,100	19	$2,674,500	$2,620,800	+ 353,700	Mt. Deb.	11½	11	26½	Nil
	Buenos Ayres Gt. Southern	5,084	20.11.37	129,094	+ 7,035	21	2,537,097	2,334,902	+ 202,195	Ord. Stk.	31¾	13¾	15	Nil
	Buenos Ayres Western	1,930	20.11.37	42,866	+ 984	21	951,986	844,996	+ 106,990	"	29¾	11	12½	Nil
	Central Argentine	3,700	20.11.37	109,386	— 19,502	21	2,670,719	2,878,017	— 207,298	"	32 9/32	8¾	12	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	21	4½	5½	Nil
	Cent. Uruguay of M. Video	980	13.11.37	18,736	+ 1,067	20	314,060	312,088	+ 1,972	Ord. Stk.	7¾	3	3	Nil
	Cordoba Central	1,218	20.11.37	29,160	— 1,900	21	663,740	675,020	— 11,280	Ord. Inc.	5	1	2½	Nil
	Costa Rica	188	Sept., 1937	29,141	+ 14,946	13	78,466	52,763	+ 25,683	Stk.	36½	32	31½	6⅜
	Dorada	70	Oct., 1937	14,700	— 400	44	154,300	141,700	+ 12,600	1 Mt. Db.	107	101½	107½	5 9/16
	Entre Rios	810	20.11.37	11,514	— 2,298	21	279,538	265,202	+ 14,336	Ord. Stk.	17	6	7½	Nil
	Great Western of Brazil	1,092	20.11.37	11,700	— 400	47	365,000	368,200	— 3,200	Ord. Sh.	1/2	3/16	3/8	Nil
	International of Cl. Amer.	794	Sept., 1937	$388,185	+ $83,061	39	$4,426,545	$3,929,645	+ $496,900	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	1/2	-/6	1/2	Nil
	La Guaira & Caracas	22§	Oct., 1937	4,155	— 150	44	51,820	45,850	+ 5,970	Stk.	9	3	8½	Nil
	Leopoldina	1,918	20.11.37	20,948	— 1,072	47	1,085,427	916,625	+ 168,802	Ord. Stk.	10½	3½	3½	Nil
	Mexican	483	14.11.37	$228,700	— $84,200	20	$5,743,300	$5,140,300	+ $603,000	"	1¼	1/4	1/2	Nil
	Midland of Uruguay	319	Oct., 1937	8,915	+ 76	18	32,602	32,299	+ 303	"	1½	1/8	1/2	Nil
	Nitrate	384	15.11.37	9,315	+ 3,297	46	135,662	107,905	+ 27,757	Ord. Sh.	63/6	41/9	2	Nil
	Paraguay Central	274	13.11.37	$2,847 000	+ $457,000	20	$62,748,000	$51,061,000	+ $11,687,000	Pr. Li. Stk.	85	71	80½	7 1/16
	Peruvian Corporation	1,059	Oct., 1937	84,277	+ 2,272	18	347,951	339,051	+ 8,900	Pref.	15	9	5	Nil
	Salvador	100	13.11.37	¢12,910	— ¢3,290	20	¢242,394	¢222,011	+ ¢20,383	Pr. Li. Db.	18	16	22½	Nil
	San Paulo	153½	14.11.37	27,600	— 3,598	46	1,502,306	1,341,135	+ 161,171	Ord. Stk.	86	46½	60½	8¼
	Taltal	160	Oct., 1937	2,815	— 850	18	12,885	12,420	+ 465	Ord. Sh.	11 5/32	1/-	3/4	13 5/16
	United of Havana	1,353	20.11.37	14,345	+ 414	21	346,852	319,381	+ 27,471	Ord. Stk.	3¼	1	2	Nil
	Uruguay Northern	73	Oct., 1937	979	— 192	18	3,384	3,771	— 387	Deb. Stk.	5	3	3½	Nil
Canada	Canadian National	23,767	14.11.37	771,063	+ 28,450	46	34,665,416	32,173,117	+ 2,492,299	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	76	51	65½	6⅛
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104⅝	99¾	100½	4
	Canadian Pacific	17,228	14.11.37	615,400	+ 54,400	46	25,192,000	24,004,200	+ 1,187,800	Ord. Stk.	16⅝	10 15/16	8	Nil
India†	Assam Bengal	1,329	31.10.37	47,880	+ 4,664	29	783,266	737,848	+ 45,418	Ord. Stk.	87¾	82¼	77½	3⅞
	Barsi Light	202	31.10.37	2,655	+ 578	29	72,802	65,932	+ 6,870	Ord. Sh.	77½	65½	51	9 13/16
	Bengal & North Western	2,111	31.10.37	78,818	+ 3,760	4	204,053	214,237	— 10,184	Ord. Stk.	319	292 5/8	308	5 13/16
	Bengal Dooars & Extension	161	10.11.37	4,639	+ 186	30	90,747	82,102	+ 8,645	"	127½	118	86⅛	7
	Bengal-Nagpur	3,268	31.10.37	190,050	+ 12,435	29	3,980,029	3,508,163	+ 471,866	"	104	100¼	91½	4⅝
	Bombay, Baroda & Cl. India	3,072	10.11.37	211,350	— 15,825	30	5,266,125	4,934,700	+ 331,425	"	114	110½	113½	5¼
	Madras & Southern Mahratta	3,229	31.10.37	150,375	+ 666	29	3,187,410	3,136,209	+ 51,201	"	116½	108½	108½	7⅝
	Rohilkund & Kumaon	572	31.10.37	11,896	— 2,128	4	35,076	38,591	— 3,515	"	311	286	310	5 13/16
	South Indian	2,531‡	20.10.37	123,647	+ 7,254	28	2,346,835	2,255,674	+ 91,161	"	107½	102 5/16	102½	5⅝
Various	Beira-Umtali	204	Sept., 1937	98,053	+ 13,994	52	975,721	803,277	+ 172,444	—	—	—	—	—
	Egyptian Delta	620	31.10.37	11,850	+ 1,579	29	150,462	138,948	+ 11,514	Prf. Sh.	21¼	15⅞	11¼	Nil
	Great Southern of Spain	—	—	—	—	—	—	—	—	Inc. Deb.	11½	1⅛	3½	Nil
	Kenya & Uganda	1,625	Oct., 1937	189,128	+ 6,241	44	2,303,239	2,131,020	+ 172,219	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	50½	37	46½	7½
	Midland of W. Australia	277	Sept., 1937	15,003	+ 33	13	37,926	36,835	+ 1,092	Inc. Deb.	97	93½	95	4 5/16
	Nigerian	1,900	9.10.37	36,840	+ 1,634	28	1,293,695	820,447	+ 473,248	—	—	—	—	—
	Rhodesia	2,451	Sept., 1937	432,312	+ 96,504	52	4,635,398	3,543,364	+ 1,092,034	—	—	—	—	—
	South Africa	13,263	6.11.37	662,079	+ 28,414	32	20,258,393	19,057 190	+ 1,201,203	—	—	—	—	—
	Victoria	4,774	June, 1937	793,223	+ 89,530	52	10,135,291	9,689,925	+ 445,366	—	—	—	—	—
	Zafra & Huelva	112	Sept., 1937	15,307	+ 8,641	39	117,046	65,948	+ 51,098	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16.

* Traffic affected by strike. † Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value.

Diesel Railway Traction

Engine Rating

JUST why oil engines are often given overload ratings existing for 10 min., 30 min., an hour, or some other period of time, is not always obvious, and just what fixes a continuous output in relation to other outputs would seem to be very arbitrary. There is no standardised basis of testing oil engines of the railway type, and it appears that this introduction of a time element may have been due to a mere copying of electrical tests, where the rating is governed by the temperature rise, which is a function of load and time. But in an oil engine of reasonable design and construction, and in a normal state of repair, there is no temperature rise other than will be built up in a comparatively short space of time. The maximum output of an engine does not depend upon time, but upon the amount of air which can be drawn into the cylinders and upon the mechanical resistance of the moving parts. Where time does enter is in the case of fatigue of various parts subjected to continuous high stress and temperature, or repeated stress reversals, but the time required for any effect to be felt from this cause is so long that it cannot be considered in relation to a "rating," but only to the engine life, which is not based on test bench performances, as are ratings. The only basic figure which can be obtained on the bench is the peak output, and any rating given may be compared with this peak in order to get some idea of probable engine life. Such a procedure gives no indication as to how near an approach to the peak might be applied over a long period, but it does show that such things as 10-min. or half-hour ratings are largely valueless. Even long-time tests, such as the 72-hr. continuous run given to railcar engines in France, prove nothing but a general reliability, for they give no indication of the life and none of the possible peak output. If any non-maximum-load test at all would show anything, it would be something similar to the 720-hr. continuous run of a four-stroke engine mentioned elsewhere in this issue.

Comparisons are Odious

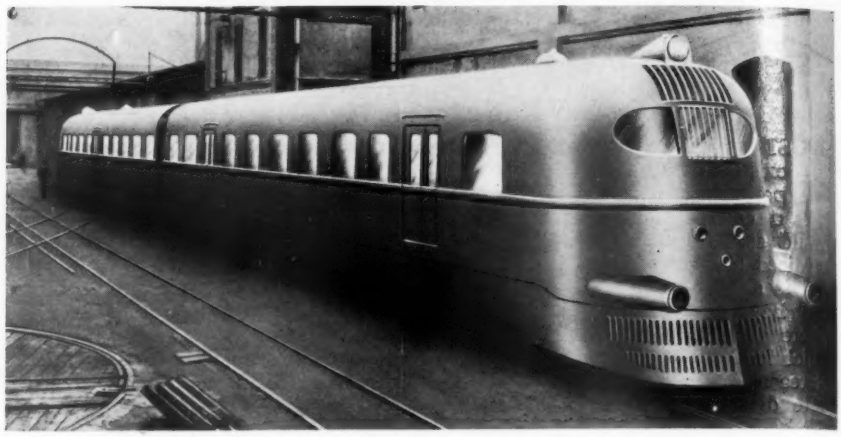
IT is to be regretted that a number of somewhat disparaging comparisons relative to diesel traction—particularly the high-speed type—should have been allowed to pass unchallenged in the discussion on Mr. Barrington-Ward's paper on "Modern Developments in Railway Operating Practice," read before the Institute of Transport on November 8. Protagonists of diesel traction should have seen to it that they had some qualified representative present to take part in the discussion. A reference was made to the withdrawal of the Flying Hamburger trains as being "significant," but of course those trains have not been "withdrawn" in the true sense of the word, and we ourselves had emphasised this a week previously, and gave some of the reasons. Since then we have had a letter from Herr Direktor Stroebe, the Reichsbahn railcar chief, in which he says that the services with diesel trains were resumed on November 7, and that the reason for the immediate temporary suspension of three diesel services at the same time was the decision to replace the carrying axles, which had shown undue signs of fatigue, and this could be done more conveniently if a few trains were dealt with at one time. The dozen or so high-speed diesel trains now on order will be placed in service during 1938, although, of course, in the same year the Berlin—Munich service is likely to be withdrawn when electrification is completed between Nuremberg and Leipzig. On the subject of costs, a three-car 1,200 b.h.p. diesel-electric train of the Hamburger type could be bought for about £24,000, but the seven-car Silver Jubilee train and engine of the L.N.E.R. only cost £10,500 more. It is difficult to see why the Silver Jubilee train should have been compared with a 115-ton 820 b.h.p. diesel train which is not the Flying Hamburger type, for the latter has not an increase in power despite a 30 per cent. increment of weight relative to the latest Hamburgers and a 40 per cent. increase over the original train. Moreover, the Silver Jubilee train works over a more difficult line than the Berlin—Hamburg route. It is to the credit of such an underpowered diesel train that the makers would guarantee end-to-end times only 6 per cent. more than that of a specially-designed steam train. But with a diesel train of 115 tons weight with 1,200 b.h.p. of engine power (similar to the three-car Reichsbahn trains) the timings could have gone below the four-hour limit from London to Newcastle. If one really desires to obtain the most efficient motive power for any given duty, alternative systems should not be unduly penalised. Diesel trains are akin to steam locomotives in their reaction to oveloading. It is not an uncommon sight in England to see a steam engine hauling a train less than its own weight, and therefore one could hardly object to the provision of 9 or 10 b.h.p. per ton for a super-speed service in place of 7 b.h.p. as stipulated for a London—Newcastle diesel. It is this underpowering which has been largely responsible for the comprehensive maintenance organisations found necessary in the U.S.A., where only 5 to 7 b.h.p. per ton is provided for trains required to operate over 2,000-mile routes, climbing to over 5,000 ft. above sea-level, at overall speeds of 56 to 58 m.p.h.

Another Belgian Extension

THE Belgian National Railways' satisfaction with the 29 single cars and 9 twin and triple articulated trains, is expressed by the placing of orders for 18 trains and 6 single-unit railcars. In none of these vehicles is electric transmission incorporated, although all the previous multi-car trains of the Belgian National Railways have had electric drive. The new programme comprises 6 three-car trains each powered by two 600 b.h.p. Maybach 12-cylinder engines fitted with Büchi superchargers and driving the wheels through Voith-Maybach hydraulic transmission; 12 twin-car trains, each powered by two 380 b.h.p. Carels-Ganz engines (of the same general type as those installed in the Central Argentine trains described on the following page) and having S.L.M.-Winterthur oil-operated mechanical transmission; and 6 single cars each equipped with one 380 b.h.p. Carels-Ganz engine and one set of S.L.M.-Winterthur transmission.

DIESEL TRAINS FOR SOUTH AMERICA

Powerful twin-car design for heavy interurban service



Twin-car Central Argentine Railway train at the Ganz works

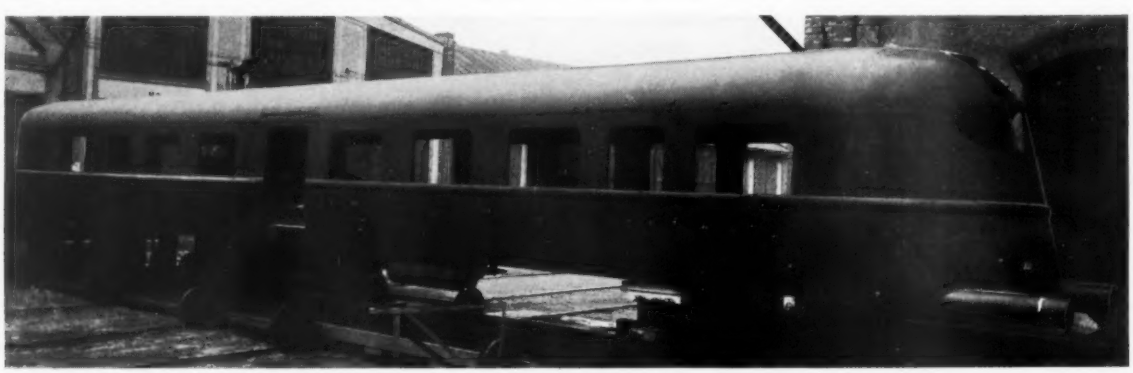
IN the spring of this year the Central Argentine Railway placed an order with Ganz & Co., of Budapest, for a dozen twin-articulated diesel trains for operation on 5 ft. 6 in. gauge tracks. Some of these units are now completed, and are scheduled to be put into traffic early in 1938, and it is expected that the last of the rakes will leave Budapest by the end of January next.

These 12 twin-car trains are of two types, each with the same engine power and equipment, and the same general lines of construction, but with different interior layouts, although both have first and second class accommodation only. The general arrangement of each type is shown by the accompanying drawings. The inner ends of the cars are articulated, and supported on a common two-axle bogie of the Jacobs type; the front and rear ends of the train are supported on two-axle bogies carrying the two 320 b.h.p. engines and mechanical transmissions. Driving cabins are fitted at both ends. These trains are intended for operation on the Rosario-Belle Ville, Cordoba-Belle Ville, Retiro-Zarate, and Retiro-Capilla del Señor lines, and are designed for a maximum service speed of 68 m.p.h.

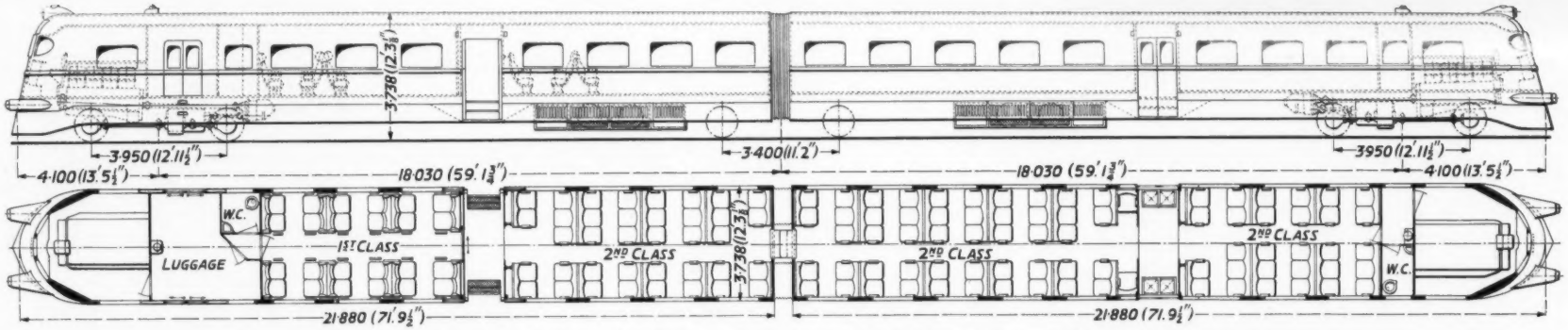
Body and Framing

A semi-streamlined contour has been given to the ends of the train in order to reduce the air resistance to some extent, and for the same reason the exterior sheathing of the cars has been kept as smooth as possible and the vestibule bellows adapted to the full width of the vehicles. The bottom edge of the side panels has been brought down level with the axles, but there is no bottom plate between the bogies.

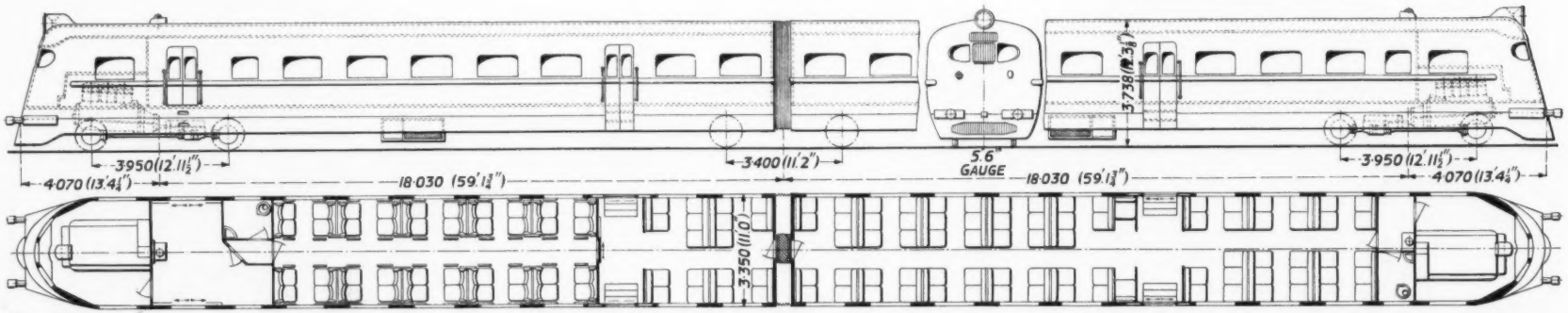
Following Ganz standard practice, the body and underframing is built up by electric welding as an integral unit in the form of a girder in which each member takes a proportionate part of the load. The material used is a chrome steel with a tensile strength of 32 to 38 tons per sq. in., a yield point of 22½ to 25½ tons per sq. in., and an elongation of 21 to 18 per cent. on a length equal to ten diameters. In the direction transverse to rolling the elongation is 19 to 16 per cent. In addition to the relatively high yield point, a further advantage of this steel is its high resistance to corrosion. The underframe portion has two outside longitudinal members of stiff section swept right round the car at the bow ends, and two lighter inner longitudinals spaced widely apart in front of the bogie centres in order to clear the engine. Owing to the low side platforms necessary to enable passengers to enter the side doors from rail level, both the inner and outer longitudinals are interrupted, and stout welded steel frames have been incorporated below the entrance vestibules in order to give a continuity to the whole frame structure. It is not too much to say that a satisfactory design at this point could not have been achieved if welding had not been



74-ft. welded steel body of one of the twin cars



Central Argentine Railway diesel train, type A, seating 24 first class and 117 second class



Central Argentine Railway diesel train, type B, seating 40 first class and 97 second class

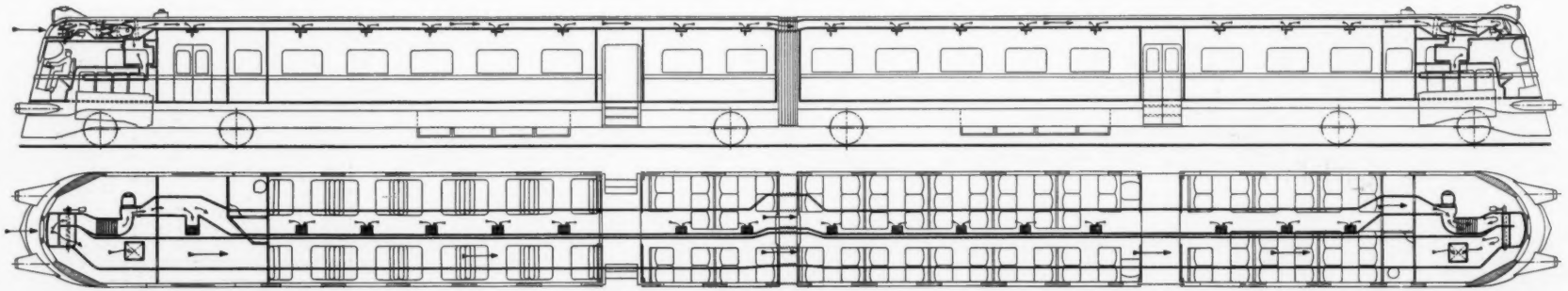


Diagram of forced ventilation circuits as applied to the Ganz diesel trains shown above

used. There are no diagonal members between the floor and the waist rail, but the square panels are of small dimensions and the function of diagonal bracing is performed by the outer panel plates. On the other hand, the inner and outer members of the underframe portion are braced both diagonally and at right angles. The end headstocks carry emergency spring buffers and drawgear, and there is a welded steel cowcatcher below the frame level.

The first type of train, class A, of which there are two, has seating accommodation for 24 first class and 117 second class passengers, whereas type B, of which there are ten trains, has seats for 40 first class and 97 second class passengers. Thanks to the wide Argentine loading gauge, comfortable and amply-dimensioned seats have been made possible without unduly extending the car length. The first class seats are arranged in two groups of two seats, one group on each side of the central aisle, and the second class accommodation is arranged with two seats on one side of the gangway and three on the other. The first class seats are upholstered in leather and the second class in imitation leather. The windows can be lowered, and are fitted with wooden louvres. Both types of rakes have separate lavatory accommodation for first and second class, and one vehicle of each train has a luggage compartment.

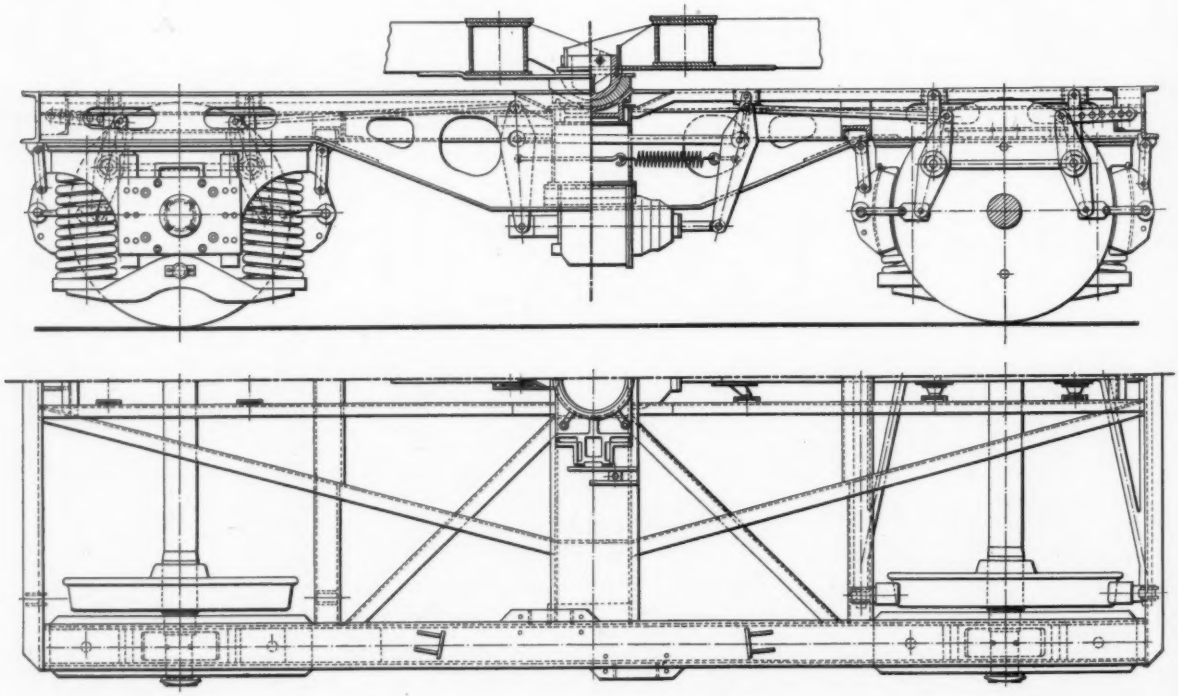
Air-conditioning is not incorporated, but there is a system of forced ventilation, in which the fresh air is taken in at the front end of the train, according to the direction of travel, and passed through a duct, the rear end of which is automatically closed. After passing through a filter, the air is led through the duct which passes down the ceiling of the whole train, and is forced by electric fans into the passenger saloons through adjustable valves. An airtight bellows arrangement at the vestibule connects the ducts of the two cars. The air intake at the leading end of the train also serves for the air required by the main engines, and the relation of the engine-air ducts to the ventilating ducts is shown on an accompanying diagram. Heating of the saloons is effected by gilled-tube heaters fed with the engine cooling water.

Bogies

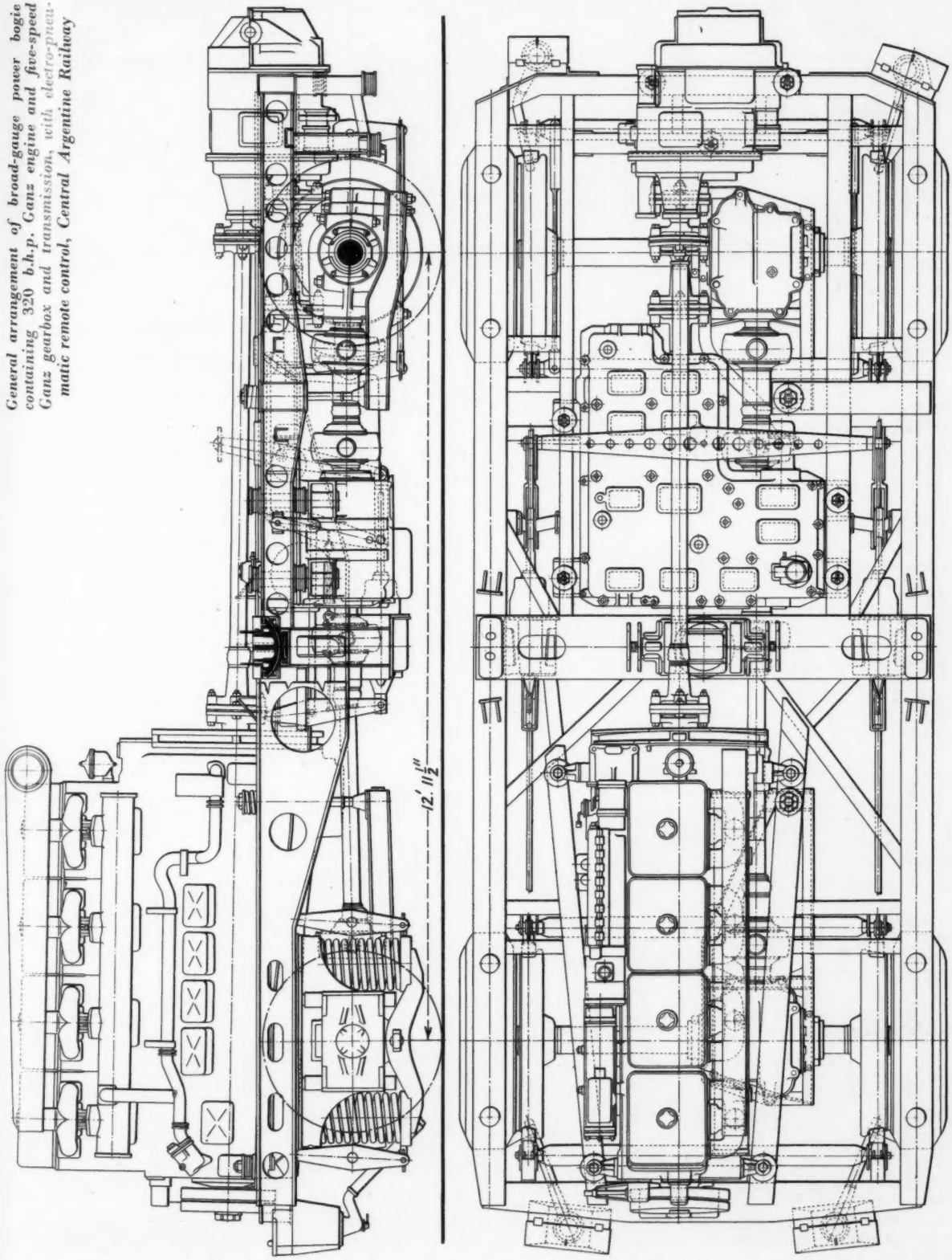
Here, again, normal Ganz design, exemplified by a non-bolster bogie with suspension entirely by helical steel and rubber springs, has been adopted, but the extra few inches of gauge width have allowed a most simple and efficacious design to be followed despite the size and power of the engine. As with the body framing, the steel used for the bogie frame structures is of the 32-38-ton chrome type, and is entirely welded up. Owing to the dimensions of the engine and transmission, the power bogie has a wheelbase of 12 ft. 11½ in. against the 11 ft. 2 in. of the articulation bogie.

An essential consideration was that, despite the long wheelbase, there should not be the slightest deformation of the bogie frame structure from the concentrated vertical and horizontal loads due to the weight of the car body and the centrifugal force arising from that mass. At the same time the bogie had to give good guiding action without detrimental rolling or lateral play. The main side girders of the bogie frames are of box section with deep side piece, and top and bottom welded tie pieces. These outer longitudinals are supplemented by others of similar section carrying the engine and gearbox, these inner members running from the outer headstocks to the centre transom carrying the hemispherical pivot.

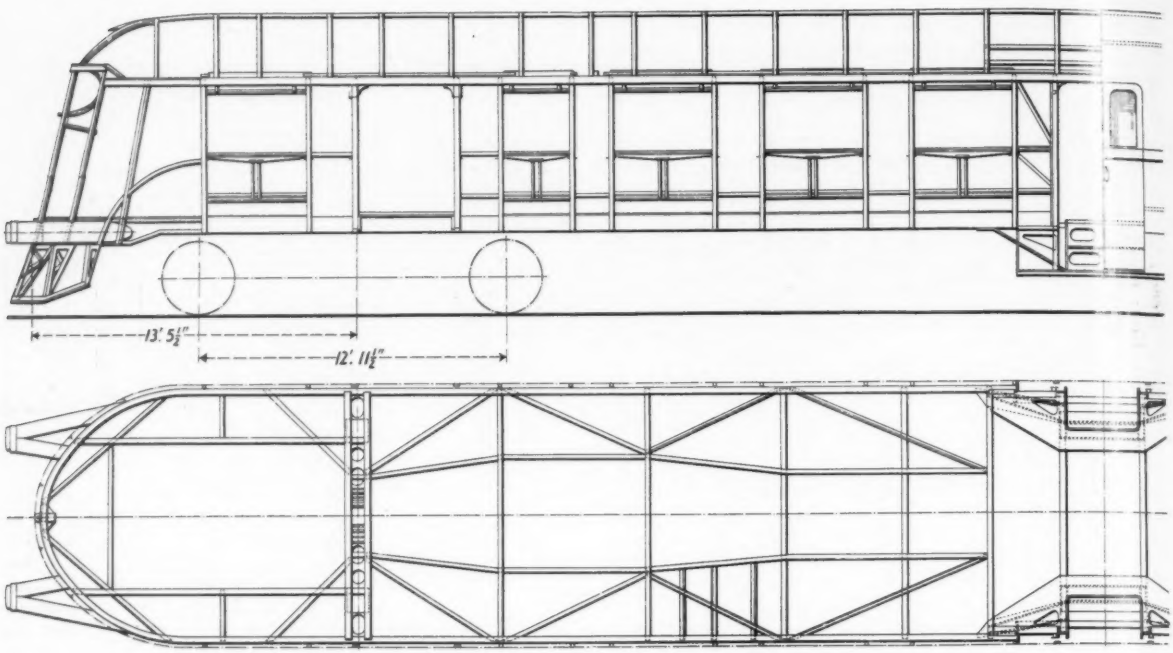
Each of the Skefko roller bearing axleboxes is supported by two groups of triple helical springs connected by a short equalising lever pivoted below the axlebox. The two outer springs of each set serve to take up the normal load and the periodic vibrations, such as those set up by the passage over rail joints. When additional forces, such as those arising from the centrifugal force on passing round curves, are set up, the innermost spring, which has a shorter free length than the others, begins to carry a share of the load, and the deflection of the spring



Articulation bogie, with a wheelbase of 11 ft. 2 in., for 5 ft. 6 in. gauge diesel trains



General arrangement of broad-gauge power bogie containing 320 b.h.p. Ganz engine and five-speed Ganz gearbox and transmission, with electro-pneumatic remote control, Central Argentine Railway



Portion of welded steel body frame of one of the Central Argentine trains

group per unit of load is decreased. Accurate and ample guidance of the axleboxes, without any play, is necessary when helical springs are used alone, and the large surfaces of the axlebox guides made possible by the use of the box girder frame structure assist in this respect, and further help is given by the manner of the support given to the journal by the roller-bearing axlebox, provision being made for the axle to adjust itself in the bearing. As the centres of the axleboxes coincide with the centre lines of the girder frames, there is no bending moment in the transference of the load.

An extensive use of rubber cushioning springs has been made in order to damp out vibrations of small magnitude and high frequency, and to reduce noise. There are double rubber cushions above the axlebox springs in order to isolate the non-springborne masses from the sprung portions, and the bogies are isolated from the car bodies by rubber cushions below the pivots and side bearers. Rubber cushions also are fitted against the tractive and lateral thrust faces.

Knorr automatic air brakes are incorporated, and the two cylinders on each bogie, located low down in line with the centre pivots, actuate clasp rigging applying two blocks on each wheel. The rigging is compensated, and each cylinder applies the four blocks down its particular side. The brake air supply is used also for the sanding gear, applied to the outer sides of the driving bogie wheels.

Engine and Transmission

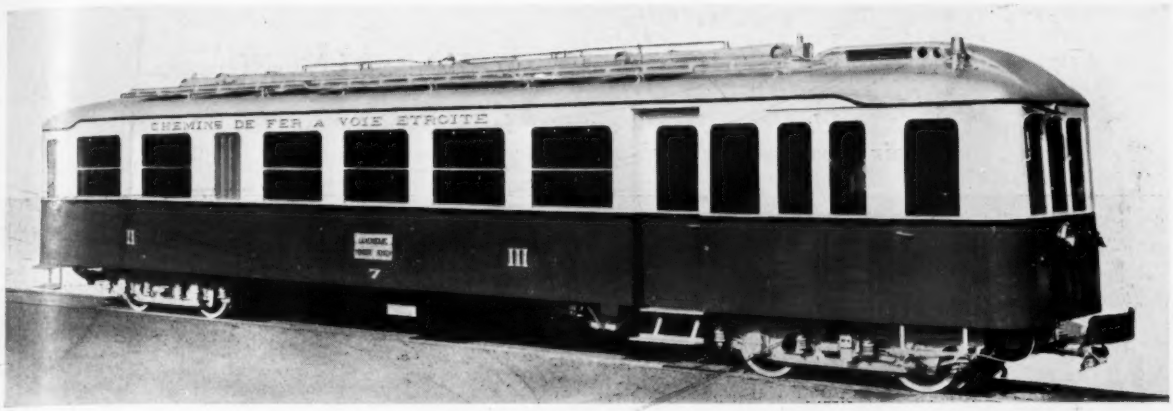
The engines are of the VIIIJaR170 Ganz-Jendrassik type with eight cylinders having a bore and stroke of 170 mm. by 240 mm. respectively. The normal output is 320 b.h.p. at 1,250 r.p.m., this conservative output having been adopted in view of the relatively frequent stops and general characteristics of the service on the Central Argentine Railway. In other cases a continuous rating of 365 b.h.p. has been allowed. The maximum output is 400 b.h.p. at 1,450 r.p.m., and the weight about 7,500 lb. The general characteristics of this engine, and the whole of the Ganz JaR range, were described in the issue of this Supplement for October 29, in the article on railcar oil engines.

A special problem arose in these Central Argentine installations because curves of 90 metres (295 ft.) radius had to be traversed with a driving bogie wheelbase of 12 ft. 11½ in. For this purpose, and to provide the most uniform possible distribution of weight over the two axles, and give reasonable access to the mechanical equipment on the bogie, the main clutch and reversing gear have been accommodated in a separate casing mounted on the inner headstock of the bogie. The drive from the engine is taken to them direct through a long cardan shaft with two flexible couplings, and thence back, at a lower level, to the five-speed Ganz gearbox located between the inner axle and the centre transom, and carried on the short inner longitudinal members of the bogie frame structure. The final drives to the two axles are taken at a still lower level from the side of the gearbox, a short cardan shaft leading to the inner axle bevels and a long shaft to the outer axle. The two final shafts have metallic flexible couplings, whereas all the others have the rubber disc type. Torque rods take the thrust from the casing of each axle drive and transmit it through helical springs to the bogie frame structure.

The main clutch is of the multiple-disc type with Ferodo linings, and reversing is effected by the axial displacement of the intermediate wheel of a set of spur gears. Each set of constant-mesh spur gears in the gearbox has its own multiple-disc clutch, running in oil, and the transmission generally is of the usual Ganz pattern as described in the issue of this Supplement for July 10, 1936. The operation of the main clutch, reversing gear, and change-speed gears is effected through the electro-pneumatic remote control of compressed air cylinders on the Ganz system, as described in the October 30, 1936, issue of this Supplement.

Gilled-tube radiators are used for the engine cooling water, and that used for each engine is mounted with its two fans on a subframe below the adjacent passenger saloon. The auxiliary frame also carries the lighting

(*Continued on page* 958)



180 b.h.p. diesel-electric railcar taring 27½ tons

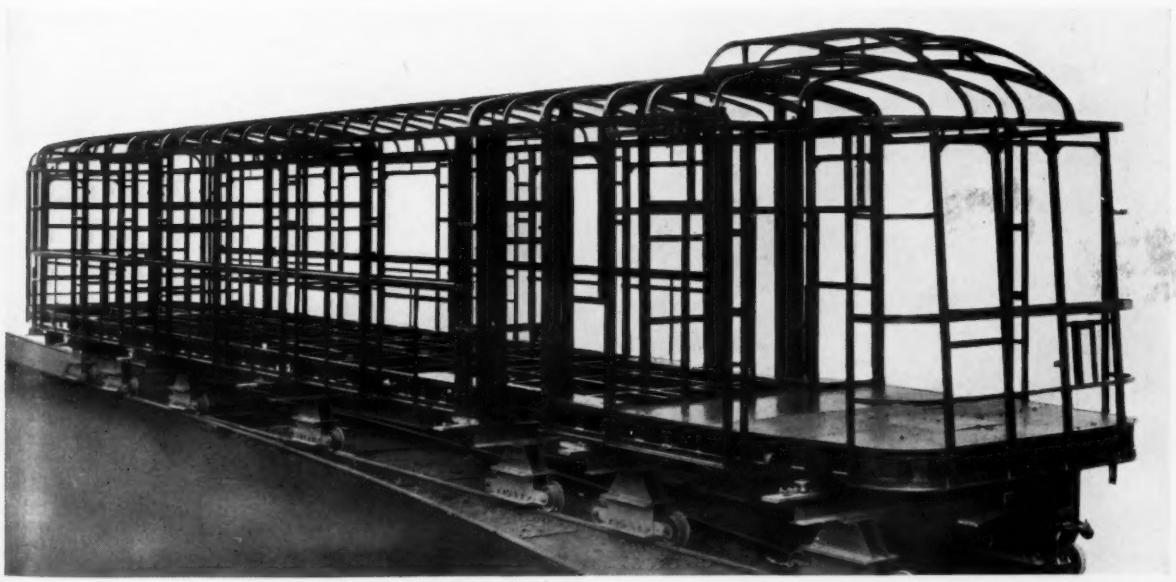
Oil-Engined Railcars in Luxembourg

Great increase in traffic follows introduction of metre-gauge vehicles

AMONG the several diesel railcars at work in the Duchy of Luxembourg are some vehicles with electric transmission, built by the Ateliers de Construction de Famille reux for the Chemins de fer à Voie Etroite de l'Etat de Luxembourg, or the Narrow-Gauge Luxembourg State Railways. Of a medium-weight type, these cars are used for trailer haulage, and the same maker has constructed a special bogie trailer with a seating capacity of 8 second class and 38 third class on a tare weight of 13·8 tons.

A Deutz A6M220 diesel engine forms the power unit. and has a continuous capacity of 180 b.h.p. at 1,200 r.p.m. and an hourly load of 200 b.h.p. Its characteristics and constructional features were described in the instalment of our article on railcar oil engines published in the September 3 issue of this Supplement. The engine is mounted on the car underframe and is directly-coupled to a d.c. generator with a continuous capacity of 114 kW. at 1,200 r.p.m. and a one-hour rating of 126 kW. This generator supplies current to four nose-suspended traction motors, each with a one-hour output of 32 kW. at 550 volts. Despite the presence of the main generator, the engine is started by two electric starting motors fed by a 24-volt 400 amp.hr. battery. The auxiliary generator is above the main generator, and is driven from it by a belt. The motors provide an aggregate tractive effort of 8,800 lb. up to 4 m.p.h. and a value of 1,000 lb. at the maximum permissible speed of 37 m.p.h.

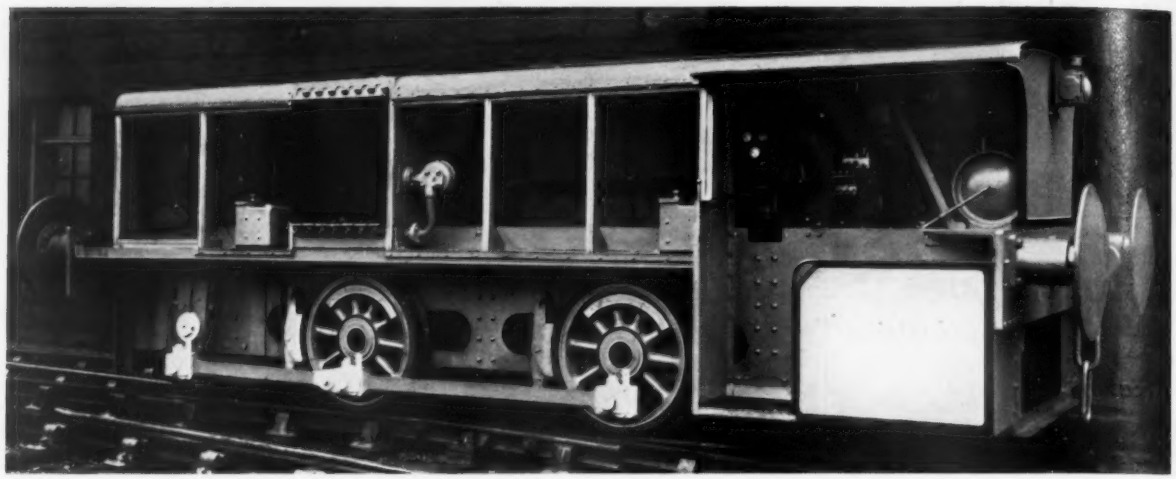
The bogies have 31½-in. wheels spread over a base of 5 ft. 11 in. and are pitched at 38 ft. 6 in. centres. They carry an all-steel body built up by a combination of welding and riveting, and which has panel plates of copper-bearing steel. The second class saloon has an interior lining of acacia and the third class saloon a lining of teak. Air brakes are incorporated and actuate clasp brakes with two shoes on each wheel. When running solo, the car can maintain a speed of 28 m.p.h. up a 1 in 50 grade, and 24 m.p.h. up the maximum grade of 1 in 30.



All-steel body framing of 55-ft. car seating 16 second class and 36 third class passengers

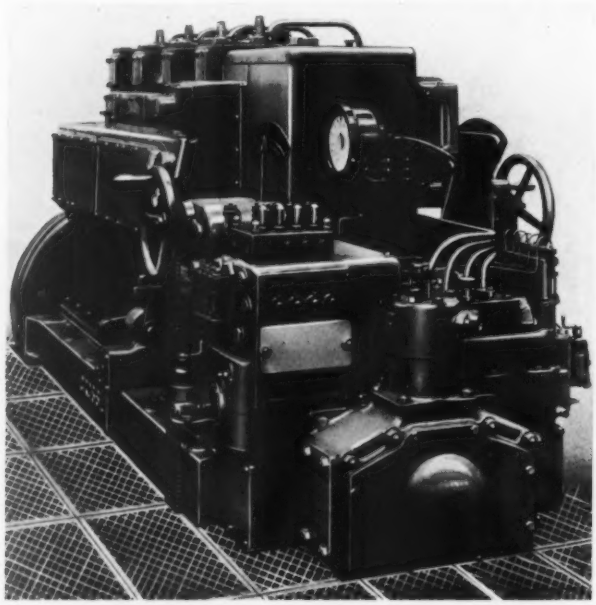
A NEW PRINCIPLE IN DIESEL SHUNTING

A quick but cushioned reversal is provided by direct air-operated reversal of a two-stroke oil engine



Stephenson-Hawthorn locomotive for standard-gauge steel mill service

THE novelty of a direct-reversing oil engine of the two-stroke type has been incorporated in a small shunting locomotive built by Robert Stephenson & Hawthorns Limited for service in the steel works of Thos. Firth & John Brown Limited at Sheffield. The engine is of the Crossley scavenge-pump four-cylinder pattern, with a normal output of 110 b.h.p. at 500 r.p.m. Both starting and reversal of the engine are carried out by compressed air, the starting being effected with the locomotive working in the first gear step, on which the air provides a starting torque greater than the full speed torque of the engine. For the first start of the day the air is supplied by a compressor located on the front of the locomotive frame, and driven by a small petrol-paraffin engine; the air for succeeding starts is provided by a built-in compressor driven from the engine crankshaft. The air storage bottles are carried above the frame, and are coupled to the manifold and valves by suitable piping. Starting, stopping, and reversing of the engine are controlled through a handwheel, and there is a speed lever which, through its connection with a variable-speed governor, controls the engine revolutions from full speed to idling. All these controls are duplicated, one set being arranged at each side of the cab.



110 *b.h.p. Crossley direct-reversing two-stroke engine, with Vulcan-Sinclair fluid coupling at the far end*

A characteristic of the engine, which is shared by other Crossley engines in sizes suitable for locomotive applications, is the maintenance of full torque over a very wide speed range. The scavenging air is delivered from a reciprocating pump driven from the crankshaft at the control end of the engine, where are grouped the fuel pumps, air starter valves, governor gear, compressor, controls and gauges. Cooling of the engine circulating water is effected in a Serck sectional radiator located on one side of the bonnet; it is provided with a belt-driven fan, and the water is circulated by a centrifugal pump. A fuel tank with a capacity of 45 gal. is fitted, and connections are made with the scavenge air manifold to provide the necessary pressure to the feed pumps.

From the engine the drive is taken through a Vulcan-Sinclair traction-type hydraulic coupling with an internal reservoir and transfer tubes. This coupling is bolted to the engine flywheel and is arranged to drive the special Stephenson-Hawthorn two-speed epicyclic gearbox through a cone ring flexible type coupling. This gearbox is fitted with an external contracting brake for first gear and a multi-plate lubricated friction clutch for the top gear; the two steps give locomotive speeds of 3 and 6 m.p.h. The gearbox has four sets of planet wheels on each train. The brake and clutch are operated by cylinders taking air from the brake reservoir, and are controlled by valves

on the brake. The main reduction gear case is of fabricated construction and provides an oil and dust tight housing for the helical main gearing and the worm and wheel main reduction. All the bearings in each gearbox are of the ball or roller type. The main reduction gear is at the front of the locomotive, and from these the drive is through a jackshaft and coupling rods. Westinghouse straight air brake equipment is fitted and is arranged to take air through reducing valves from the engine starting bottles.

Particular requirements as to starting effort had to be met, for the locomotive is required chiefly to draw concentrated loads on a single heavy bogie vehicle, so that there is no possibility of taking up the load gradually from drawbar to drawbar. Moreover, a severe restriction in height was imposed because of a low tunnel within the working area, and the maximum height from rail level is only 7 ft. 3 in., although standard buffing and drawgear is fitted, as the locomotive must handle main-line wagons. The wheels have a diameter of 37 in. and are spread over a base of 6 ft. 3 in. The working order weight is 22½ tons. Tests at the Forth Banks works before the locomotive was delivered included 57 reversals in an hour with only one of the two air bottles in operation.

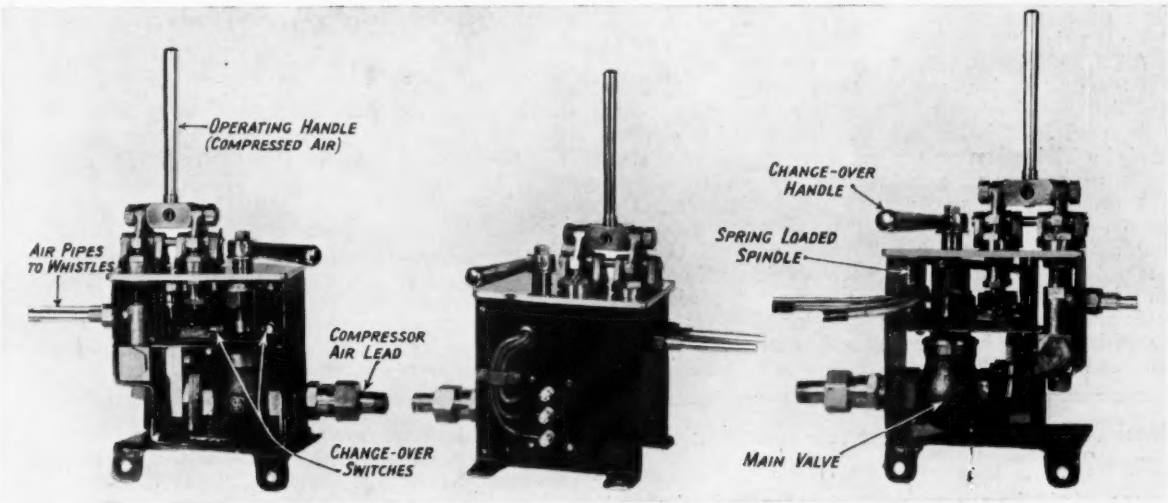
RAILCAR HORNS

THERE can have been few travellers to France within the past two or three years who have failed to notice the distinctive double note of the warning horns fitted to the numerous railcars on the five big systems. This particular sequence of notes is reserved by governmental decree for use as a warning note on railways and fire engines, and also, in large-scale applications, for air-raid warnings.

Warning equipment to similar designs and with an audibility range up to four miles under favourable conditions, has been introduced into and developed further in this country; the 18 diesel-mechanical railcars built for the Great Western Railway by A.E.C. have warning horns of this double-note type made by Desilux Electrical Equipments, of London, W.1, and others have been supplied to the Buenos Ayres Pacific Railway.

In normal applications there are four horns at each end of a railcar. They are arranged in two groups, each with one high note and one low note warning; one group is for normal operation and is worked from the auxiliary compressed air system of the railcar; the second group is installed to take over should the compressed air system fail, and it is worked from the car battery. In the G.W.R. applications there are four groups of two horns to each railcar: two groups in front and two at the back. In the original system each horn has its own operating motor when using battery current. The warning is given by the actuation of a spring-loaded hand lever when using compressed air, or by a double push-button when using the battery supply, but in the latest applications there is in the battery circuit one motor for two horns, operated in the correct sequence by a single press on one button. The motor is of the series-wound type and has directly attached to it a three blade rotor to provide the air supply. On compressed air these horns operate satisfactorily on pressures from 40 to 140 lb. per sq. in., but tests we made recently on an example of the new type of apparatus indicated that an audibility suitable for station or short-distance requirements could be given with an air pressure of less than 25 lb. per sq. in. With a pressure in the region of 90 lb. per sq. in. a full-strength blast kept on continuously for one minute uses about 8 cu. ft. of free air and the signal is efficient for a distance of 2·5 miles in normal atmospheric conditions. The emergency electric operation, which can be used also in towns or in depots, gives a range of over a mile.

The operating mechanism of the most modern type of equipment (British patent 28720) is shown in the triple illustration accompanying this article. There are three battery leads, two small air pipe leads to the two horn



Dual control box, including compressed air group and auxiliary electric group controls. The driver normally uses the upright handle and pushes it to and fro to obtain the low and high notes in correct sequence. If the horizontal handle is in a position marked on top of the box "air-tank," compressed air from the brake system is used; if the handle is in the other position, marked "battery," and half a turn further round, the notes will be obtained from the auxiliary electric group, fed from the railcar battery

groups, and one air supply pipe. The operating lever projecting from the top is pulled over and depresses the two plungers through the medium of the pivoted rocker arms; a to-and-fro movement on the lever causes the correct note sequence and the lever is returned to the vertical position through spring pressure. The short horizontal lever is for any required change-over from air pressure to battery power. The main valve is shut when this handle is turned and screwed down, and the change-over switches themselves lie above the main valve and on each side of the change-over spindle. There is a connecting cable between these two in the battery circuit.

With all normal installations the sound assembly castings are interchangeable, but the diaphragms and horns are altered to suit specific requirements of note and audibility. Each horn group has a long trumpet for the low note (sounded first), and a short trumpet for the high note.

The Commercial Motor Show

IT is the Commercial Motor Show more than any other of the regular trade exhibitions which has a value to engineers interested in diesel railway traction, for here may be seen all that is latest in the fields of high-speed oil engines and mechanical transmissions up to 150 b.h.p. Indeed, the 13th show, which was held at Earls Court from November 4 to 13, showed engines up to 300 b.h.p., the model of this size being the huge Henschel 12-cylinder *vis-à-vis* engine used in 70-seater passenger buses operating at speeds up to 80 m.p.h. Not greatly dissimilar to the German standard 275 b.h.p. horizontal engine sponsored by the Reichsbahn, the Henschel engine is quite suitable for installation in large railcars, for which application its normal output is 300 b.h.p. at 1,500 r.p.m. The cylinders are 135 mm. by 180 mm. and incorporate Lanova combustion chambers. Another horizontal engine at this year's show was an eight-cylinder Tilling-Stevens unit developing 110 b.h.p. at 1,650 r.p.m. This engine is unusual in having a cylinder bore greater than the stroke, viz., 110 mm. against 98 mm., and in the chassis shown on the Tilling-Stevens' stand it was used in conjunction with a Maybach seven-speed preselective gearbox. (See issue of this Supplement for October 2, 1936.) A very fair idea of oil-engine prices could be gained, and the high-speed light-weight engines of 50 to 120 b.h.p. running at anything from 1,500 to 2,800 r.p.m. were priced at £4·75 to £6·9 per b.h.p. In general, the smaller types of engine running at 2,000 r.p.m. or over were listed at £6 or more per b.h.p., but a 250 b.h.p. petrol type of engine with attached liquid gas (butane) plant cost only £827. Well-known railcar oil engines on view either separately or in road vehicle chassis were the Leyland 95 and 130 b.h.p models, the A.E.C. 130 b.h.p. unit, and the Gardner 6LW engine of 102 b.h.p.; various exhibits throughout the hall indicated that the Gardner oil engine is at least as popular on the road as it is for railcars. Transmission exhibits included a Tilling-Stevens military lorry in which the electric transmission was supplemented by an emergency drive consisting of a two-speed Cotal electromagnetic gearbox. The Wilson gearbox was on view on the Daimler stand, among others, and here it formed part of a Gardner engine, fluid flywheel, Wilson gearbox drive, akin to that which is so popular in Drewry railcars. A model of a simple and efficacious type of bogie for all types of railway vehicles was being demonstrated at the stand of Jonas Woodhead & Sons Ltd.

Publications Received

Injection Nozzle Testing.—A leaflet is to hand from C.A.V.-Bosch Limited, of Acton, London, giving particulars of an outfit for testing the C.A.V.-Bosch injection nozzles fitted to so many oil engines. This outfit is suitable for all servicing and repair shops where it is desired to adjust the opening pressures and inspect the spraying qualities of nozzles as fitted to engines of the usual commercial vehicle size. Full instructions for installing, operating, and maintaining this apparatus are given.

Brush Diesels.—Of recent years the diesel department of the Brush Electrical Engineering Co. Ltd., of Loughborough, has concentrated on horizontally-opposed engines, and the most recent publication, No. D. 29, describes in detail the construction, installation, and operation of these engines in sizes from 75 to 975 b.h.p. Although no rail traction applications have yet been made, the speeds of 300 to 400 r.p.m. and the heavy weight are not of themselves deterrents to the use of Brush engines in shunting locomotives, and an attraction might be the very low fuel consumption—below 0·4 lb. per b.h.p. hr. at all loads above 45 per cent. of the maximum, and with an optimum value of 0·36 lb. at full load. Bryce fuel pumps and injectors are used in these engines. The frontispiece to this publication is a folding plate showing a section through the engine.

The Development of the Automobile Radiator.—By John Coltman. Reprint of a paper read before the Midland Branch of the Institution of Mechanical Engineers, November, 1936. 8¾ in. by 6¼ in. 75 pp. Illustrated. Price 4s. net.—The impossibility of a complete mathematical treatment of radiator performance has assisted in the production of the enormous variety of cooling systems and sizes which characterise the diesel locomotives and railcars on the world's railways. In this reprint the subject is one applicable in railway work to the smaller types of railcar, where the cooling systems are akin in their construction to those of road vehicles, although the author mentions the equipment of such powerful vehicles as the Flying Hamburger. The construction of the three basic types of radiators is discussed with the aid of numerous illustrations, and some consideration is given to oil cooling and the use of engine circulating water as a medium for heating passenger vehicles. Aero-engine cooling, by water and by air, is covered in a section by itself, and other sections deal with radiators for industrial machines and development tests for automobile equipments.

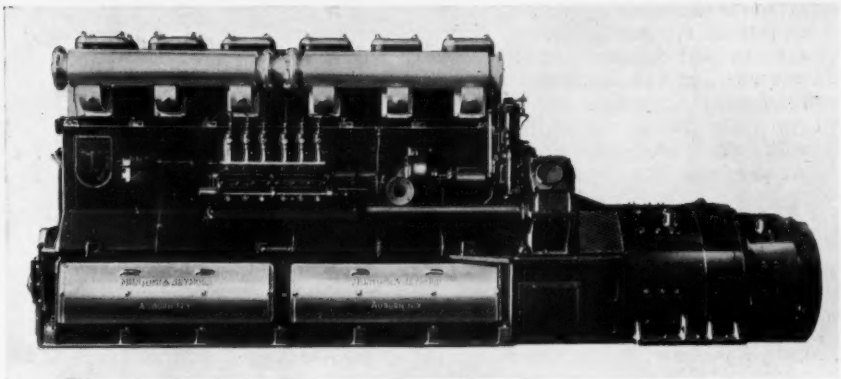
Diesel Trains for South America—(*continued from page* 954)

dynamo, air brake compressor, and other auxiliaries, and this equipment, as well as the radiator fans, is driven from the power equipment on the bogie by cardan shafts with flexible joints.

The engine rooms at each end of the train are separated from the luggage compartment and passenger saloons by gas-tight sheathings insulated against heat and sound, and these casings can be easily removed for the purpose of inspecting the engines. Both sets of power equipment can be operated either singly or together from either of the two driving positions. To make the driver's task as easy as possible, the electro-pneumatic remote control of the gear-changing incorporates the automatic control of the engine speed during the passage from one gear step to another.

RAILCAR OIL ENGINES

The fifth and last instalment of this article describes the engines used in North America for railcars and high-speed streamlined diesel-electric trains



660 b.h.p. six-cylinder Alco oil engine with attached 450 kW. main generator, as used in the Gulf, Mobile and Northern Railroad trains

THERE is a considerable difference between the oil engines used in railcars and trains in the United States and those installed in other parts of the world. This is due partly to the size, for there are few engines of less than 600 b.h.p., and partly to the fact that single-unit railcars are not so popular as multi-unit high-speed trains with power cars resembling a locomotive, and containing an engine or engines of 600 to 1,200 b.h.p. In addition to the makes described hereinafter, there are others, such as the Waukesha and Buda, which are available for railcar work, and some, like the Busch-Sulzer, Cooper-Bessemer, and Caterpillar, which have been installed in locomotives only.

Alco

The American Locomotive Company was associated with the earliest diesel locomotive developments in the U.S.A., but after taking over the McIntosh & Seymour Corporation it sponsored the development of a series of engines suitable for locomotive, train and heavy railcar work. All are to the same general design, but by the use of welded frame construction and the adoption of aluminium alloy pistons the weight of the railcar and train models has been reduced to about 35 lb. per b.h.p., compared with the 50 to 60 lb. of the purely locomotive engines. The complete range comprises 300, 600, 660 and 900 b.h.p. unsupercharged engines, of which the 660 and 900 b.h.p. sizes are suitable for railcars and trains. Büchi superchargers have been fitted to some of the 600 b.h.p. engines and give a normal output of 900 b.h.p., although a peak output of 1,200 b.h.p. has been obtained. All models have six cylinders but in the original series there was an 8-cylinder engine of 900 b.h.p.

The cylinders are cast in a single block, of cast iron, with removable liners incorporated. Individual cylinder heads of cast iron are used. These have a uniform section, are water-jacketed and are secured to the cylinder block by large-diameter studs. Two exhaust valves, two intake valves and one injection nozzle are symmetrically located in each cylinder head; the injection nozzle is located in the centre of the head and is designed to give proper fuel atomisation. The valve gear is of the rocker type and is totally enclosed and pressure lubricated.

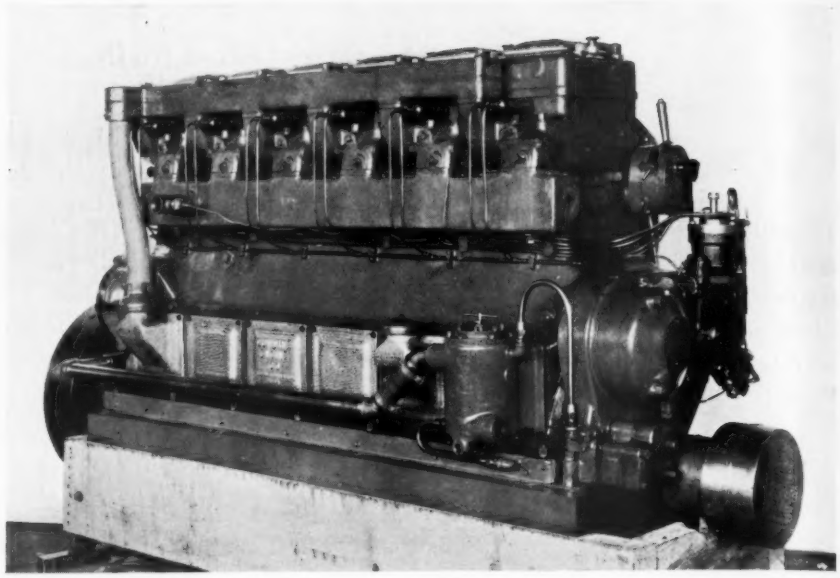
The cast iron engine frame is of the integral base type, the frame supporting the engine bearings and the frame supporting the generator being all in one piece. Detachable covers are provided on each side of the engine frame, giving free access to the main and big-end bearings. The main bearings are rigidly located in the engine frame. The bearing shells are of bronze and are lined with babbitt; the bearing caps are of cast steel, and the bearings are bored and reamed with the caps in place. The crankshaft has six throws (with hollow-bored pins) and is of heat-treated steel supported in seven main bearings. The crankpin diameter is $8\frac{1}{4}$ in. and the length 6 in.; the main bearing diameter is $9\frac{1}{2}$ in. and the length $5\frac{1}{2}$ in. The engine has an exceptionally large crankshaft, which assists in eliminating any serious torsional vibration within the working range.

Connecting rods are of forged steel. The crankpin bearing shells of bronze are lined with babbitt, and have bearing caps of forged steel. The small end of the rod is fitted with a bronze bushing for the wrist-pin bearing, and the rods are rifle-drilled to carry lubricating oil from the big-end bearing to the wrist-pin bearing. The fully-floating gudgeon pins are ground to size, and have a

CHARACTERISTICS OF ALCO RAILWAY OIL ENGINES

Service	B.H.P.	R.P.M.	Construction	Weight, Lb.	Weight, Lb. per B.H.P.	No. of Cyls.	Bore and Stroke, In.	Piston Speed, Ft. per Min.
Loco.	300	700	Cast iron ..	15,520	51·8	6	$9\frac{1}{4} \times 10\frac{1}{2}$	1,225
Loco.	600	700	Cast iron ..	35,450	59·0	6	$12\frac{1}{2} \times 13$	1,515
Railcar	660	740	Welded ..	24,000	36·4	6	$12\frac{1}{2} \times 13$	1,605
Loco.	900	700	Cast iron ..	39,000	43·3	6*	$12\frac{1}{2} \times 13$	1,515
Railcar	900	700	Welded ..	28,000	31·1	6*	$12\frac{1}{2} \times 13$	1,515

* Buchi supercharger.



Six-cylinder four-stroke 250 b.h.p. Cummins engine with a rated speed of 1,000 r.p.m. A feature of all the Cummins engines is that all the auxiliaries, such as fuel pumps and governor, water pump, and lubricating oil pump, are removable as assemblies, with the minimum of disconnection

diameter of 6 in. and a length of 5 in. The trunk type pistons are of aluminium alloy and are fitted with five compression and two scraper rings.

Büchi superchargers have been applied to some of the engines with 12½ in. by 13 in. cylinders, and give normal power increases of 50 per cent. Indicator cards taken from these engines show that there is no exhaust back pressure during the interval of overlap between inlet valve opening and exhaust valve closure. Further particulars of these Alco-Büchi supercharging applications will be found on page 591 of the issue of this Supplement for October 1, 1937.

Cummins

The Cummins was the second oil engine used in railcar work in the U.S.A., for it was installed in the original stainless-steel pneumatic-tyred railcar of the Pennsylvania Railroad. This make is used extensively in road transport and marine work, as well as for tractive purposes in railcars and locomotives and for auxiliaries in streamlined high-power trains.

A range of seven models in three classes varying from 55 to 250 b.h.p. is available for transport work, and the main characteristics are as shown in the accompanying table. In all types the special design of Cummins fuel injection is used; it effects the metering, preheating and injection of the fuel through a central multi-hole nozzle in a plain combustion chamber. The pump is a low-pressure valveless single-plunger unit, self-adjusting to engine speed and load, and with a distributor taking the fuel to each cylinder.

Both the HA and L types have the cylinders and crankcase cast *en bloc*, of an alloy iron, and have cast iron liners inserted. In the HA series the cylinder heads are cast in pairs and in the L series, individually. The pistons are of nickel-chrome cast iron and carry four pressure and two scraper rings. Fully-floating gudgeon pins, 2 in. diameter in the HA engines and 2⅞ in. in the L series, transmit the load to alloy steel rods with respective lengths of 12 in. and 18 in. The big-ends are 3⅛ in. diameter by 2⅛ in. long in the HA series and 4¼ in. diameter by 3⅝ in. long in the L series. The crankshafts are of chrome-nickel-molybdenum heat-treated steel with bearings 3¼ in. diameter in the HA engines and 5½ in. in the L models. The camshafts are of casehardened steel and are driven through helical gears from the main shaft. Both the lubricating oil and circulating water pumps are of the centrifugal type, but the first is gear-driven and the second belt-driven from the main shaft. The oil pump assembly can be removed without the necessity of draining the oil. The fuel pump, distributor, and governor are built as a single unit. In addition there is an HB6 model developing 150 b.h.p. at 1,800 r.p.m.

Fairbanks-Morse

An unusual type of two-stroke engine has been evolved by the Fairbanks-Morse Company for diesel traction, but up to the present has received only three applications. The engine now built has three double cylinders containing opposed pistons, each with a diameter of 5 in. and a stroke of 6 in. At 1,200 r.p.m. the rated output is 300 b.h.p., and the weight, including a welded steel underbed, is about 20 lb. per b.h.p. The engine has upper and lower balanced crankshafts and a single output shaft, and the general arrangement is reminiscent of the Junkers type of engine. A Roots scavenging blower is located at the front end of the engine and is chain-driven at a speed 50 per cent. above the engine speed. The same chain drive caters also for the fuel injection pump, fuel transfer pump, and oil pump. The intake and exhaust

CHARACTERISTICS OF CUMMINS ENGINE

	4 HP	6 HP	4 HA	6 HA	6 HB	L 3	L 4	L 6
Type	4	6	4	6	6	3	4	6
No. of cyls.	4⅞ × 6	4⅞ × 6	4⅞ × 6	4⅞ × 6	—	7 × 10	7 × 10	7 × 10
Cyl. bore and stroke	1,200	1,200	1,800	1,800	1,800	1,000	1,000	1,000
R.p.m.	55	85	85	125	150	125	167	250
Max. normal b.h.p.	0·42	0·42	0·48	0·48	—	0·44	0·44	0·44
Fuel cons. at full load, lb./b.h.p. hr.	0·415	0·415	0·40	0·41	—	0·385	0·385	0·385
Fuel cons. at ¾ load, lb./b.h.p. hr.	2,695	3,225	1,550	1,950	—	4,645	5,475	7,175
Weight, including all accessories and clutch, lb.								

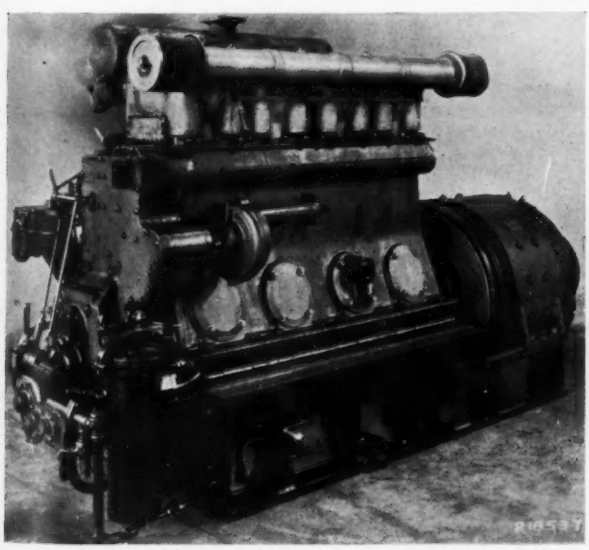
ports are uncovered by the pistons. Proposals have been made to build this type of engine in powers up to 2,400 b.h.p. with four double cylinders 12 in. bore by 15 in. stroke.

Hercules

The Hercules Motor Corporation, represented in Great Britain by Automotive Products Limited, of London, W.1, makes six sizes of engine between 75 and 175 b.h.p. and with top speeds of 1,000 to 2,600 r.p.m. A new four-cylinder 70 b.h.p. model is in course of development. All types incorporate the Hercules patent air-cell and electrically-hardened crankshafts. The smaller models have the cylinder block and crankcase cast integrally of a molybdenum-alloy cast iron, but in the 175 b.h.p. engine these constituents are separate, the cylinder block being of molybdenum cast iron and the crankcase of aluminium alloy or cast iron as preferred. Removable dry-type liners are standard practice above 100 b.h.p., but no liners are used below that figure. The spherical air cell forms part of the cylinder block casting and not part of the head; it has a heat-insulated steel insert, and is connected to the combustion space proper by a horizontal tangential passage. The compression ratio is standardised at 14·5 : 1. Aluminium alloy pistons with four pressure and two scraper rings are connected to nickel-chrome-molybdenum steel rods by fully-floating gudgeon pins. The engine weights vary from 11 to 15 lb. per b.h.p. and the fuel consumptions from 0·44 to 0·48 lb. at full-load full-speed, to 0·39 to 0·41 lb. at three-quarter load. Bosch fuel injection pumps are used. The camshafts of all models are located in the crankcase; they are gear-driven from the main shaft and are carried in ball bearings.

Ingersoll-Rand

This is really a locomotive engine weighing approximately 60 lb. per b.h.p., and in this form it was used in a huge double-bogie railcar incorporating two 300 b.h.p. engines running at 600 r.p.m. Since then, the Boston & Maine Railroad has acquired a single-unit railcar for trailer haulage in which the engine speed has been raised from 600 to 750 r.p.m. and the top normal output to 400 b.h.p. The six cylinders remain as before, viz., 10 in. by 12 in. but the weight has dropped to about 48 lb. per b.h.p. Changes in the design to suit this increase in speed took the form of lowering the inertia forces and perfecting the fuel system, but the final development of the fuel system still keeps to the original twin-opposed single-hole nozzles; the compression ratio has been slightly increased. When running at 600 r.p.m. and near full load, fuel consumptions of 0·37 to 0·38 lb. per b.h.p. hr. are obtained regularly; the full-load fuel consumption of the original locomotive-type engines of 1924-25 was 0·43 lb. per b.h.p. hr. The crankcase is cast separately of iron; each cylinder is a separate iron casting bolted to the crankcase but not to its neighbour; rigidity is given by bolting together the individually-cast cylinder heads. The newest engines are totally-enclosed by a light sheathing.



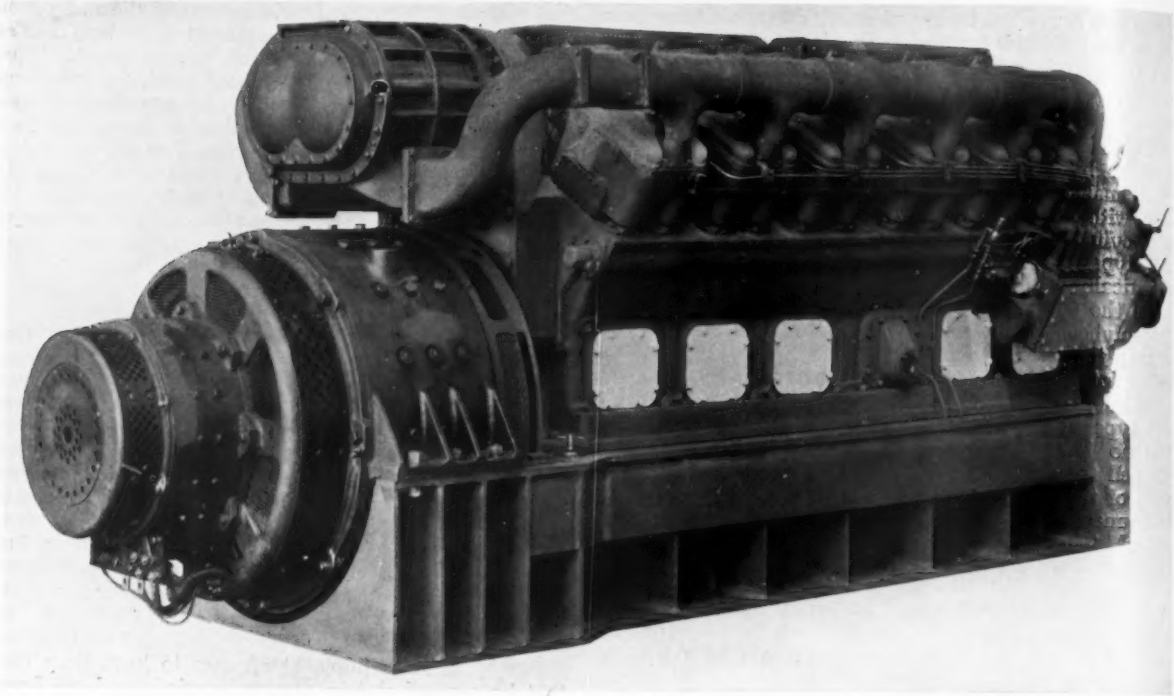
Westinghouse four-cylinder 265 b.h.p. engine

Westinghouse

All the Westinghouse engines are derived directly from the Beardmore railway oil engine, and the Westinghouse Electric & Manufacturing Company held a Beardmore licence for North America. The first engines built were six-cylinder and eight-cylinder vertical engines developing 300 and 400 b.h.p. respectively at 800 r.p.m. in cylinders 8 in. by 12 in., and this was evolved into a six-cylinder engine with a bore and stroke of 9 in. by 12 in. and rated at 350 to 400 b.h.p. at 900 r.p.m. according to the duty. A four-cylinder 9 in. by 12 in. engine has been built and is rated at 265 b.h.p. maximum, *e.g.*, on the Seaboard Air Line. About four years ago a 12-cylinder vee engine developing 800 b.h.p. at 900 r.p.m. was developed. On occasion, this engine has been supercharged on the Roots system, but this equipment appears to have been fitted to take care of certain overload periods and no figures as to normal maximum supercharged output have been made available, although it is understood that over 1,000 b.h.p. has been developed.

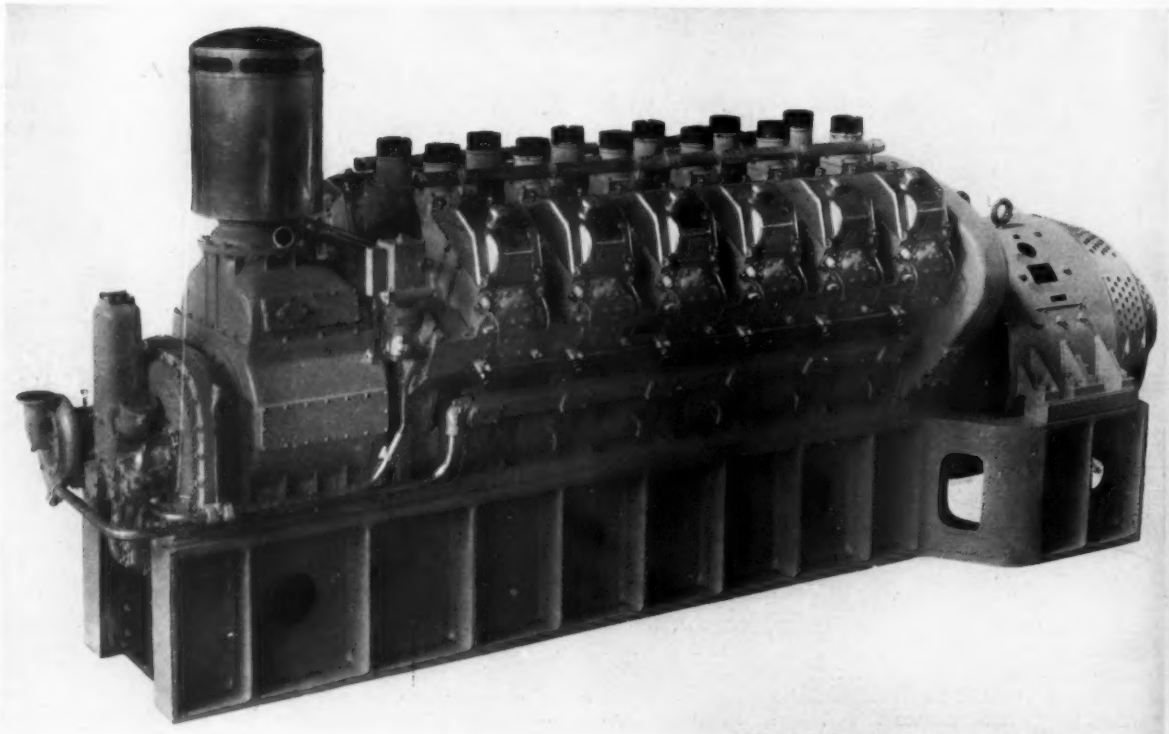
The 800 b.h.p engine has two banks of 9 in. by 12 in. cylinders with an included angle of 60 deg. Speed varies from 380 r.p.m. at idling to 900 r.p.m. at full load. The crankcase is an integral steel casting incorporating the cylinder blocks, and is machined to take the wet-type nickel cast iron liners. The upper end of the liners is clamped rigidly in place between the cylinder head and block, and the lower end is sealed by heat-resisting rubber-compound rings. The individually-cast cylinder heads are of aluminium alloy and have steel inserts for the valve seats. In the upper and outer sections of the crankcase are cored chambers for the two gear-driven camshafts, one to each cylinder bank. These camshafts and their cams are integral forgings of heat-treated 5 per cent. nickel steel, and through push rods of steel tube and rocker arms supported on the heads they operate the two inlet and two exhaust valves of each cylinder. Both types of valve are made of silichrome steel, and the nickel-steel rocker arms operate in sleeve bearings and have valve-clearance adjusting screws.

Special forged aluminium alloy is used for the pistons, which carry four pressure and two scraper rings. The fully-floating alloy steel gudgeon pins have aluminium end caps, and are fitted with bronze bushings in the small ends of the rods. The connecting rods are forged of alloy steel containing 2·75 to 3·25 per cent. of nickel, 0·6 to 0·95 per cent. of chromium, and 0·3 to 0·4 per cent. of carbon. The big-end bearings have a babbitt lining on a bronze shell. Alloy steel is used also for the six-throw counterbalanced crankshaft, and contains 3·5 per cent. of nickel, 0·6 per cent. of chromium, and 0·3 per cent. of carbon, but some shafts have been made of a steel containing 2·85 to 3 per cent. of nickel, 0·65 per cent. of chromium, 0·25 per cent. of molybdenum, and 0·3 per cent. of carbon. The hollow-bored crankpins are 5·75 in. in diameter and the seven main bearings 6·0 in. A spring-loaded friction disc type of vibration damper is fitted on the non-driving end of the shaft.



1,000 b.h.p. Westinghouse engine with gear-driven Roots supercharger

A gear-driven six-ram Westinghouse fuel injection pump of the constant-stroke variable cut-off type is mounted on each side of the crankcase at the vibration damper end, and serves the adjacent bank of six cylinders. The spring-loaded needle valves and multi-hole injection nozzles in the centres of the cylinder heads are also of the Westing-



Winton two-stroke engine developing 900 b.h.p. at 750 r.p.m. in 12 cylinders. Both the engine and the attached d.c. main generator are mounted on a common underframe of welded steel

WINTON TWO-STROKE RAIL TRACTION OIL ENGINES

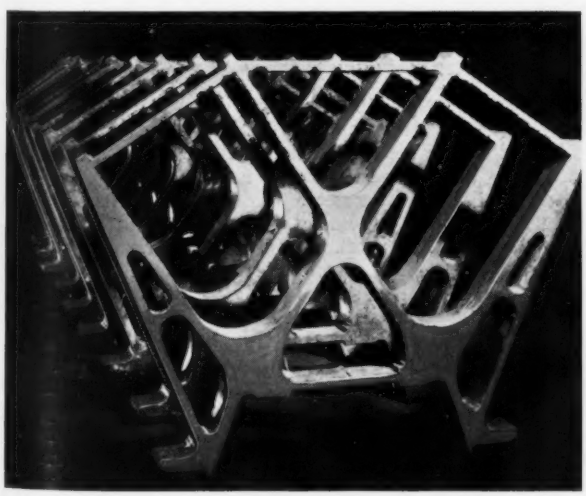
Model	No. of Cyls.	Type	R.P.M.	B.H.P.	Cylinder Bore and Stroke, Inches	Piston Speed, Ft. per Min.	Brake M.E.P., Lb. per Sq. In.	Weight, lb. per B.H.P.
201A–8	8	Vertical	750	600 (660)	8·0 × 10·0	1,250	79 (86)	20·8
201A–12	12	Vee	750	900 (990)	8·0 × 10·0	1,250	79 (86)	20·0
201A–16	16	Vee	750	1,200 (1,320)	8·0 × 10·0	1,250	79 (86)	20·0

Figures in brackets represent maximum output at same rotational speed.

house type. A motor-driven feeder pump brings the fuel from the tank through filters to the injection pumps. The governor is of the variable-speed oil pressure type. Gear-driven pressure and scavenging pumps are incorporated in the pressure lubrication system, and the other auxiliaries, such as the governor oil pump and the centrifugal water pump are gear-driven also, the gear wheels being of 3·5 per cent. nickel steel.

An endurance test with one of these engines covered a 720-hr. non-stop run, and during this period the engine made 33,000,000 revolutions and 198,240,000 explosions. The twelve pistons travelled 150,000 miles and the atomisers made 198,600,000 strokes. The lubricating oil pump circulated 518,400 U.S. gal. of oil through the engine. The equipment operated 360 hr. at full load and the remaining 360 hr. on a variable-duty cycle running at full load for 1·7 min. and idling 1·7 min.; the engine accelerated 10,800 times in accomplishing this duty cycle. A constant-speed motor with gear reduction unit attached was used to operate a switch which energised or de-energised the operating relays. The total test represented about 50,000 miles of railcar operation or 5,000 hr. of locomotive performance.

In the supercharged engines, mounted, like the ordinary type, on a welded-steel underbed which is prolonged to carry the main generator, the Roots blower is driven by a train of gears located at the nodal point of the shaft system. This arrangement, together with the spring-loaded clutch used, minimises the transmission of critical vibrations to the supercharger drive. The blower provides air at a pressure of about 5 lb. per sq. in.



Welded steel crankcase framing of one of the Winton 16-cylinder 1,200 b.h.p. engines

Winton

The Winton engine is the most extensively used of all railway two-stroke engines, and is made in three sizes, viz., 600, 900 and 1,200 b.h.p., all running at 750 r.p.m., and with 8, 12 and 16 cylinders respectively. The main characteristics are shown in the accompanying table. A full description of the constructional features of all three models was published in the issue of this Supplement for May 14 last. Attention, therefore, need only be drawn to the leading features, but further particulars are given in regard to the scavenging arrangement and the performance on different fuels.

In both the straight-eight and vee engines the crankcase and cylinder block structure is formed of plates welded to a skeleton framework which is itself fabricated by welding. Nickel-chrome-molybdenum steel is used for the crankshafts, and both the pins and shaft are hollow-bored and have bearings lined with Satco, a 98 per cent. lead-base whitemetal. Wet-type nickel-chrome cast iron liners are inserted in the cylinder block, and the same material is used for the individual cylinder heads.

Each cylinder head carries four exhaust-valves 2.77 in. diameter and with a lift of 0·56 in.; they are spread symmetrically round the central fuel-injection nozzle, and there is no port swirl. Scavenging air is provided by a chain-driven Roots blower running at 1,500 r.p.m. and delivering about 6,000 cu. ft. of free air a minute at about 3½ lb. per sq. in. pressure in the eight-cylinder engine. The rotor lobes are helical, to produce a uniform flow of air, and both they and the stator are of aluminium alloy. Twenty-four slanted scavenging air intake ports, 1$\frac{3}{4}$ in. deep and ½ in. wide encircle the cylinder liner about midway down its length, the air being passed in from the receiver formed by the engine frame structure. The scavenging air flow starts 51 deg. before the bottom dead centre, and about 28 deg. after the four exhaust valves have begun to open. The scavenge pump excess cylinder capacity is given as 64 per cent., which does not indicate as high an overall efficiency as in many slower speed two-stroke engines.

Fuel injection begins 5 deg. before top dead centre and continues for 12 deg. past it. Tests with 83 doped and undoped fuels in a Winton engine developing its normal rating of 75 b.h.p. per cylinder at 750 r.p.m. showed a generally smooth combustion for practically all fuel ignition qualities. Nevertheless, fuel ignition quality had an appreciable effect in some examples, as shown by increasing ignition delay, explosion pressure rises, and burning rates figuring on indicator cards with cetane numbers of 80 down to 20. In addition to the increased maintenance invited by the use of fuel below 45 cetane number, there was a progressive increase in fuel consumption over the whole cetane number range with decreasing ignition quality, and fuels of a relatively high cetane number gave the best performance and economy.

NOTES AND NEWS

Cotal Gearboxes.—Cotal electromagnetic gearboxes to transmit 450 b.h.p. at 1,500 r.p.m., are now being tried in Italy, and the Belgian National Railways are to try three boxes of the same make.

American Diesel Locomotive.—The Pennsylvania Railroad, whose only diesel vehicles hitherto have been a handful of railcars, have ordered a 600 b.h.p. Winton-engined diesel-electric locomotive from the Electro-Motive Corporation.

Italian Activities.—The complete passenger services on the Civitavecchia-Orte and Gorizia-Aidussina lines of the Italian State Railways are now operated by diesel railcars. A beginning has been made with the replacement of all the steam tramway services in the province of Parma by oil-engined vehicles.

Government Locomotives.—Two locomotives with 150 b.h.p. engines, have been ordered by the Air Ministry and two with 153 b.h.p. Gardner engines by the War Office. Andrew Barclay, Sons & Co. Ltd. is the main contractor, and in each case Vulcan-Sinclair fluid couplings and Wilson four-speed preselective epicyclic gearboxes are incorporated.

Sudan Diesels.—Mr. C. J. H. Hunter, the acting General Manager of the Sudan Railways, informs us that the Drewry diesel locomotives mentioned on p. 425 of the issue of this Supplement for September 3, were not ordered by his administration, but by the Public Works Department of the Sudan Government, and are intended for use in connection with a sand-removal scheme.

5,400 B.H.P. Trains.—The first of the two 17-car diesel-electric trains of the Union Pacific Railroad has now been completed. These two trains are intended for high-speed service between Chicago and California, and as recorded in the issue of this Supplement for January 22 last, each train will incorporate six 900-b.h.p. Winton two-stroke engines.

Australasian Orders.—The Drewry Car Co. Ltd. has received an order from the Tasmanian Government Railways for four standard Drewry diesel power bogies, and another from the Ohai Railway, New Zealand, for one Drewry diesel shunting locomotive. In each case, Gardner engines, Vulcan-Sinclair fluid couplings and Wilson epicyclic gearboxes are used.

More French Producer-Gas Cars.—The French State Railways have taken delivery of the first of the three new Panhard producer-gas engines, and are conducting tests on it prior to installation in the first of the three railcars being built by De Dietrich. This engine has 12 cylinders, 140 mm. by 160 mm., arranged in vee formation, and develops a continuous output of 275 b.h.p. at 1,750 r.p.m.

New South Wales Activity.—Four new petrol-engined trains are to be acquired by the New South Wales Government Railways. They will be worked singly or with one or two trailers as required. A number of light rail buses is being built for up-country districts; these vehicles will have 18 seats of one class and a small amount of luggage room.

Railcars for India.—The Drewry Car Co. Ltd. has received an order for four double-power bogie diesel railcars for the Nizam's State Railway. The power units will be of the usual Drewry standard type, with Gardner engine, Vulcan-Sinclair fluid coupling and Wilson epicyclic gearbox, and the coaches will be equipped with full air-conditioning plant, to be supplied by J. Stone & Co. Ltd. The order also includes one complete spare power bogie. The railcars will be supplied to the inspection of Sir Douglas Fox and Partners.

South African Enquiries.—The South African Railways are calling for tenders for a dozen double-bogie diesel railcars, and some spare equipment, for operation on the 3-ft. 6-in. gauge lines. Tenders are to be in by January 12. It will be seen that the present proposals represent a considerable advance over the allowance in the 1937-38 budget, as detailed on p. 768 of our issue of October 29. The Johannesburg City Council is calling for the presentation of tenders by December 18 for one small diesel locomotive for 2-ft. gauge tracks.

Argentine Railcar Services.—According to the annual report of the Buenos Ayres Western Railway for 1936, one-class diesel railcar services were instituted during that year between Lincoln and Bragado, and Lincoln and Villegas. The Lincoln-Bragado service has given fairly good results, as an omnibus service between Lincoln and Los Toldos has suspended service; the evening diesel railcar service (first class only) to Pehuajo has also been successful in recapturing traffic, and a rival omnibus service from Buenos Aires to Primera Junta was suspended. The success already obtained with these one-class vehicles shows quite clearly that the introduction of cheap fares between the more important camp towns and the surrounding villages will deflect passengers from the road, and even create a hitherto-non-existent traffic. The Once-Pehuajo diesel railcar service ran throughout the year with great success; this would appear to indicate that the public welcome fast services at convenient hours which enable them to journey to Buenos Aires and other important towns *en route*, and back, during the same day. Two diesel-electric railcars were placed in service during 1936, and orders were placed for the acquisition of 28 light diesel railcars, to replace steam trains on several sections of the line.

[These 28 cars are included in the order for 99 Drewry diesel cars placed jointly by the Buenos Ayres Great Southern and Buenos Ayres Western Railways.—ED.]

Egyptian News.—At a meeting of the Egyptian Railway Board, held on October 18, it was decided to replace all the steam trains on the Cairo-Helwan suburban line by diesel railcars, and it is expected that the new all-diesel service will begin to operate during December. The vehicles used will be the twin-car Ganz sets, which are powered by 240 b.h.p. engines, and which have been delivered during the present year. They are similar in construction to the 10 single-unit cars described in detail in the issue of this Supplement for September 6, 1935. The new twin-car rakes will operate a 7- to 15-min. service, according to the traffic requirements, and will carry first and second class passengers. Tickets will be issued on the zone system, with the line divided into four zones. When diesel train No. 29, worked by one of the articulated units, passed through El Maasara at 11.01 on July 26, the signalman on duty noticed smoke coming from the engine compartment of the rear coach and forwarded the "stop-and-examine-train" code to Tura El Asmant. The car was stopped at Tura El Asmant, where it was found to be on fire, so the passengers were detrained, and with the assistance of the staff of the adjacent cement factory, the two coaches were disconnected. The fire brigades of El Maadi and Helwan arrived at 11.20 and the fire was extinguished at 11.45, after causing considerable damage to the coach. An inquiry revealed that the fire was probably due to a piece of waste soaked in paraffin or oil having been left in the elbow of the exhaust pipe.